



**US Army Corps
of Engineers**
St. Paul District

Phase I Report

MPCA Phase I Environmental Site Assessment

CONTAMINATED MATERIALS & GROUNDWATER INVESTIGATION

**Chaska Flood Control Project
Stages 3 and 4
Chaska, Minnesota**

DISTRIBUTION STATEMENT A
Approved for Public Release
Distribution Unlimited

August 1992

20050210 003

Best Available Copy

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188							
<small>The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.</small> PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.											
1. REPORT DATE (DD-MM-YYYY) 8/92		2. REPORT TYPE Phase I report		3. DATES COVERED (From - To)							
4. TITLE AND SUBTITLE Contaminated materials and groundwater investigation Chaska flood control project, stages 3 and 4 Chaska, Minnesota : MPCA Phase I environmental site assessment.				5a. CONTRACT NUMBER							
				5b. GRANT NUMBER							
				5c. PROGRAM ELEMENT NUMBER							
				5d. PROJECT NUMBER							
6. AUTHOR(S)				5e. TASK NUMBER							
				5f. WORK UNIT NUMBER							
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Corps of Engineers, St. Paul 190 5th St. E. St. Paul, MN 55101				8. PERFORMING ORGANIZATION REPORT NUMBER							
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)							
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)							
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution											
13. SUPPLEMENTARY NOTES											
14. ABSTRACT This report summarizes the environmental investigation findings based on historical, geological, and regulatory agency records for stages 3 and 4 of the Chaska Flood Control Project. This investigation was conducted in order to minimize the possibility that unexpected hazardous, toxic, or otherwise regulated materials and/or contaminants will be encountered during construction phases of the project.											
15. SUBJECT TERMS Flood control Minnesota River Environmental protection											
16. SECURITY CLASSIFICATION OF: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; padding: 2px;">a. REPORT</td> <td style="width: 33%; padding: 2px;">b. ABSTRACT</td> <td style="width: 33%; padding: 2px;">c. THIS PAGE</td> </tr> <tr> <td style="text-align: center;">Unclassified</td> <td style="text-align: center;">Unclassified</td> <td style="text-align: center;">Unclassified</td> </tr> </table>			a. REPORT	b. ABSTRACT	c. THIS PAGE	Unclassified	Unclassified	Unclassified	17. LIMITATION OF ABSTRACT		18. NUMBER OF PAGES
a. REPORT	b. ABSTRACT	c. THIS PAGE									
Unclassified	Unclassified	Unclassified									
					19a. NAME OF RESPONSIBLE PERSON 19b. TELEPHONE NUMBER (Include area code)						

TABLE OF CONTENTS

Description	Page
<u>Purpose</u>	1
<u>Property Location</u>	1
<u>Project Description</u>	1
<u>Background</u>	2
<u>Site Geology and Soils Characterization</u>	
General Topography	2
General Geology	3
Overburden Geology	3
Site Hydrogeology	4
<u>History of Ownership and Operations</u>	
Introduction	5
Background	6
Property Features	7
Site Visit Findings	7
<u>Analysis of Soil Borings for Contamination</u>	
Stage 3	8
Stage 4	9
<u>Site Stratigraphy</u>	14
<u>Regulatory Database Search</u>	
Database List	17
Summary of Database Search	18
<u>Engineering Considerations</u>	18
<u>Conclusions</u>	20
<u>Summary</u>	21
<u>Recommendations</u>	21
<u>Information Sources</u>	22
APPENDICES	

List of Appendices

Appendix A - Figures
Appendix B - Soil Boring Logs
Appendix C - Sanborn Fire Insurance Maps
Appendix D - Aerial Photographs
Appendix E - Historical Plat Maps, Data, and Information
Appendix F - Database Search InformationList of Figures

List of Figures

Figure 1 - Approximate Location Map
Figure 2 - General Plan - Stage 3
Figure 3 - Stage 3 Plan and Profile Stations 0+00 to 10+00
Figure 4 - Stage 3 Plan and Profile Stations 10+00 to 20+00
Figure 5 - Stage 3 Plan and Profile Stations 20+00 to 30+00
Figure 6 - Stage 3 Plan and Profile Stations 30+00 to 40+00
Figure 7 - Stage 3 Plan and Profile Stations 40+00 to 50+00
Figure 8 - Stage 3 Plan and Profile Stations 50+00 to 60+00
Figure 9 - Stage 3 Typical Sections
Figure 10 - Stage 3 Typical Sections
Figure 11 - Stage 3 Typical Sections
Figure 12 - Stage 3 Typical Sections
Figure 13 - General Plan - Stage 4
Figure 14 - Stage 4 Plan and Profile Stations 0+00 to 10+00
Figure 15 - Stage 4 Plan and Profile Stations 10+00 to 19+50
Figure 16 - Stage 4 Plan and Profile Stations 19+50 to 28+90
Figure 17 - Stage 4 Plan and Profile Stations 28+90 to 36+70
Figure 18 - Stage 4 Plan and Profile Stations 36+70 to 45+50
Figure 19 - Stage 4 Plan and Profile Stations 45+50 to 55+50
Figure 20 - Stage 4 Plan and Profile Stations 55+50 to 66+00
Figure 21 - Stage 4 Plan and Profile Stations 66+00 to 76+50
Figure 22 - Stage 4 Plan and Profile Stations 76+50 to 83+50
Figure 23 - Stage 4 Typical Sections Stations 0+00 to 21+00
Figure 24 - Stage 4 Typical Sections Stations 21+00 to 32+00
Figure 25 - Stage 4 Typical Sections Stations 32+00 to 42+00
Figure 26 - Stage 4 Typical Sections Stations 42+00 to 52+00
Figure 27 - Stage 4 Typical Sections Stations 52+00 to 57+75
Figure 28 - Stage 4 Typical Sections Stations 57+75 to 71+17
Figure 29 - Stage 4 Typical Sections Stations 71+17 to 76+50
Figure 30 - Soil Boring Locations - Wastewater Treatment Plant
Figure 31 - Soil Boring Locations - Proposed Carver County Government Center
Figure 32 - Stage 4 Site Stratigraphy - Profile
Figure 33 - Stage 4 Site Stratigraphy - Profile
Figure 34 - Stage 4 Site Stratigraphy - Profile
Figure 35 - Stage 4 Site Stratigraphy - Cross Sections
Figure 36 - Stage 4 Site Stratigraphy - Cross Sections
Figure 37 - Stage 4 Site Stratigraphy - Cross Sections
Figure 38 - Stage 4 Site Stratigraphy - Cross Sections
Figure 39 - Stage 4 Site Stratigraphy - Cross Sections
Figure 40 - Stage 4 Site Stratigraphy - Cross Sections
Figure 41 - Typical Relief Well Information

**Phase I Contaminated Materials and Groundwater Investigation
Chaska Flood Control Project
Stages 3 & 4
Chaska, MN**

Purpose

This Phase I investigation was conducted in accordance with the Minnesota Pollution Control Agency (MPCA) guidance from the *Property Transfer Technical Assistance Program*. This report will enable the MPCA to review and provide recommendations to the Corps of Engineers regarding a search of the available regulatory, historical, and geological sources of information. The findings, conclusions, and engineering considerations contained within this report will form the foundation for optimizing future field investigation strategies for determining, or verifying, the existence of environmental hazards.

This report summarizes the environmental investigation findings based on historical, geological, and regulatory agency records for Stages 3 and 4 of the Chaska Flood Control Project. This investigation was conducted in order to minimize the possibility that unexpected hazardous, toxic, or otherwise regulated materials and/or contaminants will be encountered during construction phases of the Chaska Flood Control Project. This study will enable the project designers to anticipate requirements for special handling of materials and groundwater during construction and to make alignment changes to minimize the need for special handling.

Property Location

The proposed flood control project is located in east central Minnesota, on the southern and eastern edges of the City of Chaska, in Carver County. Chaska is located approximately thirty miles southwest of St. Paul (See Figure 1).

Project Description

Stage 3 of the flood control project consists primarily of a diversion channel which will protect Chaska from flooding in East Creek during a 5,500 cfs flow event. This 6,000 foot long diversion channel is comprised of several segments. The diversion originates near Highway 17 and Engler Boulevard with a 3400 foot twin levee riprapped lined channel which merges into a 1,300 foot grass lined channel. The flood waters are then to be carried 1,000 feet to the Minnesota River through a concrete channel. The project also incorporates an inlet structure, two drop structures, 2000 feet of levee, four bridges, and a stilling basin (See Figures 2 through 12).

Stage 4 of the flood control project consists of 2,800 feet of new levee on the south and east side of Courthouse Lake, and raising 4,200 feet of existing levee on the south side of the City of Chaska. This stage of the project also includes an elaborate system of relief wells and interceptor pipes on the

landward side of the levee, as well as the use of wick drains and a staged construction of the levee to consolidate and strengthen the foundation soils under the new levee prism and under the fill sections required to raise the levee to its required top elevation (See Figures 13 through 29).

Background

This contaminated materials and groundwater investigation was prompted for several site specific reasons. A large pile of beet processing residue (a lime pile) is located on the proposed alignment of the diversion channel for Stage 3 of the project near the downstream end of the channel. Empty fifty-five gallon drums have been found near the outlet for Stage 3 of the project. In addition, it is known that an unregulated burn/dump site operated in the Stage 4 reach of this project for many years. Several geotechnical borings advanced for the Stage 4 reach indicate the presence of dump fill materials and light non-aqueous phase liquids and odors in the area of the burn/dump site.

Since Stages 3 and 4 of this project require excavation, dewatering, and the use of wick drains in suspect areas, a more extensive Phase II subsurface investigation is anticipated.

Stage 3 is in the preliminary design phase. Final design is anticipated to be complete in December 1993, with construction beginning in March 1994.

Stage 4 is currently in the final design phase. The final draft design is anticipated to be complete in early September 1992. The final design is expected to be complete in early December 1992, with construction beginning in February 1993.

Involvement with the MPCA to date suggests that the Corps may be required to discharge groundwater associated with construction activities to the local wastewater treatment plant and provide soil venting and capping of the abandoned burn/dump site near Stage 4. The MPCA has made no special requests as of yet for Stage 3. The Corps does not anticipate any Hazardous Toxic or Radiologic Waste (HTRW) type environmental problems on Stage 3 at this time.

The St. Paul District is committed to proactive involvement with the MPCA throughout all phases of the Chaska Flood Control Project. By working closely with the MPCA the Corps, and the City of Chaska, will be able to receive protection under the Minnesota Land Recycling Act (MLRA) of 1992. The MLRA is a statutory law which protects voluntary parties from environmental liability such as becoming a responsible party to a HTRW release.

Site Geology and Soils Characterization

General Topography

The portion of the City of Chaska, Minnesota, where the proposed flood control improvements would be located is within the Minnesota River Valley. The

valley trends northeast and is approximately 2.5 miles wide in this reach. The floodplain lies at an approximate elevation of 705, averages one mile in width, and is characterized by extensive marshy areas and lakes. Alluvial and bed-rock terraces rise above the floodplain and form regionally prominent benches at elevations of 750 and 800. Most of the developed portion of Chaska is situated between elevations of 710 and 730, at the upstream limit of a terrace that trends northeast along the base of the valley wall. The river valley walls rise sharply above the floodplain and terraces to form a bluff that grades into a hummocky, poorly-drained regional highland at an elevation of 850 on the north side of the valley, and at an elevation of 900 on the south side of the valley.

Chaska Creek emerges from the regional highland in a deep, steep-walled valley on the northwest side of Chaska and flows in a shallow channel around the western and southern edges of the city to the Minnesota River. East Creek emerges from a similar but smaller valley onto a large terrace about 1.5 miles northeast of Chaska. The creek flows southwesterly across the terrace, cuts through the northeast corner of Chaska, and joins the Minnesota River downstream of the city. Topographic features at the mouth of the East Creek ravine indicate the presence of an alluvial fan on the terrace and a previous flowage path of East Creek near the valley wall toward the northeast. The normal flow in the two creeks is sustained by groundwater discharging from pervious materials in thick deposits of glacial till that comprise the surrounding regional highlands.

General Geology

The region surrounding the project area was glaciated extensively during the Pleistocene Epoch. Advancing and retreating glaciers laid down thick deposits of unsorted till and outwash sand that today form a hummocky, poorly-drained plain dotted with numerous marshes and small lakes. The glacial drift reaches a thickness of between 200 and 250 feet and lies unconformably on dolomitic lime-stone and sandstone of the Prairie du Chien and Jordan Formations. The large valley of the present Minnesota River was carved by the glacial River Warren, which carried large volumes of water discharging from the now-extinct glacial Lake Agassiz located in western Minnesota and eastern North Dakota. Glacial River Warren cut deeply into bedrock and formed the terraces that are prominent today. As the flows decreased, the valley was filled to its present level with alluvium. Recent borings and historic water-well records indicate alluvium approximately 180 feet in thickness. Bedrock elevation is between 530 and 542 (NGVD 1929 Adj.). The upper bedrock consists of weathered to slightly weathered fine grained, silty, glauconitic sandstone of the Franconia Formation. Sandstones of the Dresbach and Hinkley Formations underlie the Franconia.

Overburden Geology

Stage 3

The substantial variability of alluvial deposits encountered by subsurface

investigations along the Stage 3 alignments do not permit a clear definition of precise boundaries between depositional time periods. However, evaluation of topographic features in combination with subsurface exploration data enabled the development of a general geologic profile across the terrace and floodplain between the valley wall and the Minnesota River in the area of the proposed diversion channel.

A general geologic profile along Stage 3 indicates glacial till in the valley wall, highly variable alluvial material within the terrace downstream from the mouth of the East Creek ravine, more uniform sand strata within the riverward portion of the terrace, and finer-grained and more variable alluvium within the floodplain of the Minnesota River. A significant amount of fill material is found on the surface near the downstream end of the Stage 3 alignment, including a lime pile deposited by the adjacent American Crystal Sugar Processing Plant.

Stage 4

Stage 4 of the Chaska Project has been divided into five reaches for the purpose of defining the overburden geology. Reach 3 extends from Station 21+00 to Station 34+00, the Stations which correspond to the area which has the most significant evidence of contaminated soils and groundwater which may affect the project.

As discussed in the DM for Stage 4, the overburden geology in Reach 3 is similar to the overburden geology in Reach 2, except that a large amount of uncontrolled fill has been placed northeast of the sewage treatment plant. The discussion of the soils for Reach 3 applies to the soils which are found below the dump fill materials (below approximately Elevation 701).

The foundation soils for the levee consist of highly plastic soft clays overlying much firmer organic silts and clays. The soft materials have a maximum thickness of about twenty-five feet. The levee alignment in this reach runs near Courthouse Lake, which is an old open pit clay mine which has been filled with water to make a suitable habitat for trout. The bottom of Courthouse Lake is below elevation 650. The lake bed has a steep slope in this area. Borings taken through the existing levee adjacent to the lake and the sewage treatment plant indicate considerable consolidation of the soft material.

Site Hydrogeology

The primary aquifers in the Chaska area consists of Pleistocene sand and gravel glacial deposits and bedrock aquifers of the Prairie du Chien dolomite and the underlying Jordan sandstone. Beneath these units are the St. Lawrence and Franconia Formations which are aquitards and generally poor water producers. The underlying Dresbach sandstone is a good aquifer. The configuration of the water table below the ground surface is expected to be a subdued replica of the ground surface. Regionally the groundwater moves toward the Minnesota River; however, complex flow patterns indicate shallow movement toward local surface drainage where discharge to streams and

evapotranspiration occurs. The uplands are recharge areas and the floodplain is a discharge area. Point source discharge (springs) along the Minnesota River Valley are common.

Local variations in precipitation and river stage are expected to be rapidly reflected in the water table in the upper soils near the Minnesota River. Stratified silts, clays and sands will yield some perched water tables. Borings in Stage 3 show artesian water in soils along the proposed channel. Channel excavations are, for the most part, above the groundwater levels in the upper reach of Stage 3. The downstream end of Stage 3 consists of marshy land with a thick mat of organic silts and clays that confine the groundwater. Excavations are well below the groundwater surface and dewatering will be a major effort. Excavations in Stage 4 are relatively shallow and the hydrogeologic conditions should result in routine construction activities.

History of Ownership and Operations

Introduction

Given the large extent of the flood control project, several properties had to be investigated. Currently the City of Chaska owns the property for the project.

The Environmental Resources Branch conducted an environmental site history for Stages 3 and 4 of the Chaska, Minnesota, Flood Control Project. The purpose of this report is to identify businesses, industries and activities in the area of the proposed flood control project that could influence the location or construction of project features and to identify areas that may require additional testing to determine the presence of contaminated conditions.

This report is based on the review of existing information in the literature, maps, historical records, aerial photographs, city directories, and similar sources. A field survey of the area was also completed. Each of the sources is discussed separately. (Field data from the literature search are on file in the Environmental Resources Branch, Cultural Resources Section.)

Background

Personnel in the Corps of Engineers Environmental Branch examined all the available maps of the Chaska area, including county plat and Sanborn Insurance maps.

Most of the plat maps are too general in nature to provide useful information about potential contaminated sites in the project area. The 1927 plat map, while detailed, does not include land within the Stage 3 project area.

The historic maps indicate that the only industry that has operated in the project area is the Crystal Sugar Factory. No dumps, landfills, or other types of waste areas, or commercial/industrial activities were indicated on the historic maps. (Copies of the available historic plat maps for the project

area are included in Appendix E).

Sanborn Insurance maps for the period between 1881 and 1924 are available at the Minnesota Historical Society. Prior to 1911, the Sanborn maps for Chaska did not extend more than 1/4 block south of First Street (toward the levee). The structures that were located south of First Street (between Spruce and Beech Avenues) were all private dwellings. Beginning in 1911, the Sanborn Maps extend farther towards the levee, but show mostly vacant lots and some private dwellings between First Street and the levee. By 1924, most of the vacant lots had been filled by private homes. The Sanborn Maps show that along the entire reach of the levee between Spruce and Beech Avenues, there was no commercial or manufacturing activities during the period between 1881 and 1924. An overview from the 1924 Sanborn map shows the location of the sugar factory in relation to the City of Chaska. A detail drawing from the 1910 Sanborn map shows the layout of the sugar factory. Copies of the 1910, 1911, and 1924 Sanborn Maps are included in Appendix C.

It should be noted that the Sanborn Maps did not extend beyond Spruce or Beech Avenues for any of the available years. (Copies of the Sanborn Maps are on file in the Cultural Resources Section, Environmental Resources Branch).

Sources available at the Minnesota Historical Society Library, including histories of Chaska and of Carver County, contained no information to indicate the potential for any hazardous/toxic sites with the reaches of Stage 4. The University of Minnesota, the Carver County Historical Society, and the Chaska Historical Society did not yield any additional information on this issue.

Property Features

A 1992 field survey and information from the City of Chaska indicated the existence of a former burn/dump site near the sewage treatment plant, located next to the railroad tracks near the river. Information provided to the team suggested that the dump had been in use since the early 1900's. However, an enlargement of a 1937 aerial photograph that was procured from the National Archives does not indicate any dump site or landfill existed in the area between Courthouse Lake and the Minnesota River. In addition, the 1937 photograph does not show any commercial or industrial development within the residential limits of the City of Chaska, along the reach of the Stage 4 levee.

The 1937 aerial photograph also shows a berm like configuration between the Crystal Sugar Plant and the Minnesota River that appears in later photographs as well. This is now the location of a lime settling pond. The 1937 photograph indicates that this berm was at least partially filled with water at that time. (See the Field Reconnaissance section for a current description of this berm/pond).

Aerial photographs from 1951, 1965, and 1974 are available in the Corps map library. A photocopy of a 1970 aerial photograph was also obtained from the Minnesota Historical Society library. The 1951 photograph was studied for indication of a dump/burn site, but none was evident. However, a small area

of fill is evident adjacent to the railroad tracks. The 1965 aerial shows a small cleared area at the end of a road near the sewage treatment plant that could possibly be a dump. The courthouse facilities are evident on the west side of Courthouse Lake. It appears that this area was filled with random fill and then graded.

The 1974 aerial indicates that this same cleared area was expanded to the east. Thus, the aerial photographs indicate that the dump was used beginning at some point in the late 1940's, rather than the early 1900's. In addition, the dump area appears to be more limited in extent than was previously suspected.

The 1951 photograph shows a small residential development west of the Crystal Sugar Plant, but no industrial or commercial development. The 1965 photograph shows more extensive residential development and commercial buildings across Highway 212 from the sugar plant, but the development does not extend very far north along the proposed Stage 3 diversion channel.

The 1970 and 1974 photographs indicate that more residential development has occurred along Highway 17 north of Highway 212, although it is not continuous. The only apparent industrial/manufacturing enterprise in the 1970's photographs is the Gedney Pickle Plant, located east of the Crystal Sugar Plant along Highway 212. The pickle factory is outside the area of the proposed diversion channel. (Photocopies of the 1951, 1965, and 1970 aerials are included in Appendix D; the remaining aerials were too large to photocopy).

Other than information about the Crystal Sugar Factory, local histories included no information about other businesses or industries in the Stage 3 project area. Business and city directories were not available for Stage 3. The City of Chaska provided maps showing current land use within the project area, but has not provided any additional information about past land use.

The Chaska Crystal Sugar Plant was built in 1906 and stopped producing granulated sugar in 1971. Information about the sugar beet manufacturing process that was conducted at the Chaska plant is included in the Appendix. The photograph did not show any additional commercial or industrial development along the proposed diversion channel in Stage 3.

The American Crystal Sugar Company has confirmed that the berm/pond identified in the aerial photographs was a lime pond used to discharge waste lime used in the processing of sugar beets. The processing of sugar beets was discontinued in 1971 and the factory has been used as a distribution center since that time. The American Crystal Sugar Company sold the lime pond site in 1978. The current owners are periodically mining the lime residue from the pond and selling it for soil amendment. (See Appendix E for copy of letter from the company).

Site Visit Findings

On May 11, 1992, members of the Chaska Environmental Site Assessment team

conducted a field tour via automobile and foot of Stage 3 of the Chaska Flood Control Project.

Three businesses along Highway 17 near the intersection with Highway 121 were noted as sitting adjacent to the proposed diversion channel in Stage 3. These were Penrith Akers, a juice manufacturing company; Hydraulic Component, Inc. and AdTech, Inc. (1605 Audobon Road). None of these appeared to pose any hazardous-toxic or contaminated waste concerns for the project.

The Crystal Sugar Factory organic waste pond, which lies between the factory and the Minnesota River within the reach of the proposed diversion channel, was noted as a potential problem area. In the aerial photographs described above, this site appears as a berm. Apparently organic waste from the sugar processing operations was placed in this pond until it became filled. Currently the pond/berm is filled to an elevation of about 15 to 20 feet above the Minnesota River. Private owners have purchased the fill site and have mined it for agricultural lime (See Figure 2 and the aerial photographs in Appendix D for the location of the berm).

Approximately 50 feet downstream from the former settling pond, a large number of 55 gallon barrels are evident buried in the top of the embankment, which is primarily sand. The exposed barrels appear to have been empty when disposed, as both ends of the barrels were cut out. It does not appear that these barrels pose a contaminant problem. However, if the final design would result in construction activities in this area, chemical analysis of the soils for contaminants is recommended.

On May 11, 1992, the St. Paul District's Environmental Site Assessment Team for the Chaska Project also conducted a field reconnaissance of Stage 4 of the project. The field reconnaissance aided in delineating the extent of an abandoned city burn/dump site between Courthouse Lake and the Minnesota River (See Figure 13). This field survey raised concerns about potential groundwater contamination near the sewage treatment plant, which is situated between the Carver County Courthouse and the Minnesota River.

Analysis of Soil Borings For Contaminated Materials

Stage 3

The subsurface investigations for Stage 3 indicate no evidence of contaminated soils and groundwater for this Stage. One soil boring, 90-174M, located at Station 8+10, 17 feet left of centerline when looking downstream (See Figure 3), indicates the top 4.8 feet (Elevation 719.2 to Elevation 714.4) of the boring is fill. The geologist logging the boring noted 20 percent of the material to be rubble consisting of metal, concrete, and wood. From 4.8 feet to 5.5 feet (Elevation 714.4 to 713.7), the geologist noted large rocks, plastic, and a concrete slab. This material is most likely not contaminated, but represents a large amount of material which will have to be moved or disposed of in an atypical manner. Soil boring logs discussed in this report are included in Appendix B.

Borings 92-172M and 92-173M were advanced through a beet processing residue (lime pile) at Stations 2+20 and 5+60, respectively. Boring 92-172M indicates the residue occurs from the ground surface to a depth of 26.9 feet (Elevation 725.3 to Elevation 698.4). Boring 92-173M indicates the residue occurs from the ground surface to a depth of 19.9 feet (Elevation 727.5 to Elevation 707.6). The residue is logged as a silty clay which is very soft, of medium plasticity, wet to saturated, white to gray in color, containing some organics in layers (1 percent sticks and roots), and having a strong reaction to acid (a calcareous substance). The Unified Soil Classification System (USCS) classification for this soil is MH. This material is most likely not contaminated, but represents a large amount of material which will have to be moved or disposed of in an atypical manner.

While determining the water level in boring 92-173M, the geologist noted that the water in the hole was bubbling vigorously. The hole had been cleaned out to a depth of 20 feet (Elevation 707.5), the hollow stem auger was set at 25 feet (Elevation 702.5), and split spoon sampling was completed to a depth of 30 feet (Elevation 697.5) at this time. The bubbling was determined to be caused by a gas source. A sample of the gas was collected in a bag, tested for flammability, and determined to be methane.

Stage 4

Soil Borings Advanced By The Corps of Engineers

This discussion of the soil borings on Stage 4 will proceed upstation along the levee. Distances to the right and to the left of the centerline of the levee are oriented looking downstation.

Eight borings have been advanced in the immediate area of the existing dump, extending from approximately Station 21+50 to Station 35+75. All of the borings have been advanced on the left side of the centerline of the levee. The locations of these borings can be found on Figures 16 and 17.

Boring 73-2M

Boring 73-2M is located approximately 110 feet left of centerline at Station 21+50. This boring has a ground surface elevation of 701.5 NGVD. Current cross sections indicate the swamp has an approximate elevation of 701.5. The current ground surface elevation at this location is approximately 724 NGVD. The groundwater surface elevation in this boring was at the ground surface. Based on this information, Boring 73-2M was most likely advanced prior to dumping activities at the site in the area of this boring. There are no indications of contaminated soils or groundwater in this boring.

Boring 82-51M

Boring 81-51M is located approximately 90 feet left of centerline at Station 23+80. This boring has a ground surface elevation of 718.75. Current cross

sections indicate the current ground surface elevation is approximately 720 or 721 NGVD, indicating some filling activities have continued since 1982. The groundwater surface elevation in this boring is 700.

The field log for this boring indicates that the top five feet (Elevation 718.75 to Elevation 713.75) of the boring is a silty, sandy gravel dump fill. Pieces of wood, paper, cloth, glass, and plastic are scattered from a depth of five feet (Elevation 713.75) to a depth of 16 feet (Elevation 702.75). The soils at a depth of 20 feet (Elevation 698.75) were noted as being an oily, gravelly, silt with a fuel oil smell. The geologist also classified the materials as trash. There are no other indications of contaminated soils or groundwater in this boring.

Boring 89-111M

Boring 89-111M is located approximately 125 feet left of centerline at Station 26+50. This boring has a ground surface elevation of 722. Current cross sections indicate the current ground surface elevation is approximately 722, indicating filling activities have discontinued since 1989. The groundwater surface elevation in this boring is 701.5.

The field log for this boring indicates traces of wood from the ground surface to a depth of four feet (Elevation 722 to Elevation 718). The soils from a depth of four feet to a depth of 10 feet (Elevation 718 to Elevation 712) are classified as a gravelly, rubbly, silty sand. Approximately 15 percent of the materials are concrete rubble and chunks of wood. The soils from 10 feet to 16 feet (Elevation 712 to Elevation 706) are classified as a gravelly, rubbly, silty sand with 15 percent of the materials consisting of broken glass, concrete, pieces of wood, and copper wire. From a depth of 16 feet to 20 feet (Elevation 706 to Elevation 702), the soils are classified as a gravelly, silty sand with traces of broken glass and wood. The soils have an oily odor and are sticky in places between these elevations. An oily odor is again noted in the gravelly, silty sand between 20 and 23 feet (Elevation 702 to Elevation 699), but there are no indications of rubble. The rubbly, silty sand is found again between depths of 23 feet to 29.5 feet (Elevation 699 to Elevation 693), with approximately 10 percent of the materials being broken glass and wood. The soils between these elevations are also oily, but an oily odor was not present. There are no other indications of contaminated soils or groundwater in this boring. However, a pilot boring advanced immediately adjacent to Boring 89-111M to obtain undisturbed soil samples indicated rubble and landfill materials from 11 to 13 feet (Elevation 711 to 709) and rubble and landfill materials with a solvent odor from 23.5 to 25.5 feet (Elevation 698.7 to Elevation 696.7).

Boring 89-126M

Boring 89-126M is located approximately 30 feet left of centerline at Station 26+50. This boring has a ground surface elevation of 707. Current cross sections indicate the current ground surface elevation is approximately 707, indicating filling activities have discontinued since 1989. The groundwater

surface elevation in this boring is 701.2.

The top two feet of this boring (Elevation 707 to Elevation 705) is a rubbly, clayey, silty sand, with approximately 15 percent of the materials classified as a rubble consisting of broken glass and pieces of wood. The soils appear to be clean until a depth of five feet (Elevation 702). At this elevation, the soils are a rubbly, silty, clayey sand, with 10 percent of the material classified as rubble consisting of broken glass and pieces of deformed iron. Twenty percent of this material is logged by the geologist as a white, gooey-clayey material, possibly a non-soil material. There are no other indications of contaminated soils or groundwater in this boring.

Boring 80-25M

Boring 80-25M is located approximately 40 feet left of centerline at Station 29+00. This boring has a ground surface elevation of 726.6. Current cross sections indicate the current ground surface elevation is approximately 726. The groundwater surface elevation in this boring is 701.6. This boring appears to have been advanced through the emergency levee, which was either constructed prior to the initiation of dumping activities or the emergency levee prism was cleared of dump fill materials prior to the construction of the levee. The former scenario is most likely correct. There are no indications of contaminated soils or groundwater in this boring.

Boring 89-110M

Boring 89-110M is located approximately 60 feet left of centerline at Station 29+60. This boring has a ground surface elevation of 726.6. The groundwater surface elevation in this boring is 687.

A slight solvent odor was noted at a depth of 26 to 28 feet (Elevation 700.6 to Elevation 698.6) in a gravelly, sandy silt. A faint solvent odor was also noted at a depth of approximately 30 feet (Elevation 696.6). There are no other indications of contaminated soils or groundwater in this boring.

Boring 89-106M

Boring 89-106M is located approximately 30 feet left of centerline at Station 31+60. This boring has a ground surface elevation of 725.5. The groundwater surface elevation in this boring is 698.6.

This boring indicates occasional broken glass and concrete chunks between the ground surface and a depth of 7.5 feet (Elevation 725.5 to Elevation 718). The soils from a depth of 13 feet to a depth of 21 feet (Elevation 712 to Elevation 704.5) is a rubbly, gravelly sand with 10 percent of the materials classified as rubble consisting of broken glass, concrete, and asphalt. There are no other indications of contaminated soils or groundwater in this boring. However, a pilot boring advanced immediately adjacent to Boring 89-106M to obtain undisturbed soil samples indicated rough drilling action from

approximately 12 feet to 15 feet (Elevation 713.5 to Elevation 710.5) and from 17 feet to 18 feet (Elevation 708.5 to Elevation 707.5). The drillers could not advance the piston sampler below Elevation 710.5.

Boring 79-12M

Boring 79-12M is located approximately 60 feet left of centerline at Station 35+75. This boring has a ground surface elevation of 711.2. The groundwater surface elevation in this boring is 707.7.

The top five feet of this boring (Elevation 711 to 706) consists of a cinders and sand fill. From five to eight feet, the soils consist of a fill containing 60 percent sand and 40 percent trash, concrete, gravel, and traces of clay. There are no other indications of contaminated soils or groundwater in this boring.

Soil Borings Advanced by Others

Wastewater Treatment Plant

Soil borings were advanced in the area occupied by the City of Chaska Wastewater Treatment Plant for the purpose of designing foundations for several upgrades to the facility. The soil borings were advanced by Braun Intertec (formerly Braun Engineering) in 1974, 1978, and 1985. The majority of these soil borings note dump fill materials from the existing ground surface to approximately Elevation 700. This is consistent with the borings advanced by the COE. The locations of the borings can be found on Figure 30. Borings ST-1, ST-2, ST-6, ST-8, ST-10, and ST-11 noted evidence of typical dump fill materials. The remaining borings advanced by Braun do not note any indications of concrete rubble or other typical dump materials on the field log.

Boring ST-1. The top 13 feet of this boring (Elevation 712 to Elevation 699) is fill. The following two feet (Elevation 699 to Elevation 697) of fill contains glass, tins, branches and is classified as soft topsoil and debris. There are no other indications of contaminated soils or groundwater in this boring.

Boring ST-2. The top six feet of this boring (Elevation 713 to Elevation 707) is fill. The following five feet (Elevation 707 to Elevation 702) of fill has traces of bricks. The following 2 feet (Elevation 702 to Elevation 700) of fill has traces of wood. There are no other indications of contaminated soils or groundwater in this boring.

Boring ST-6. The top seven feet (Elevation 716 to Elevation 709) of this boring is fill. The following five feet (Elevation 709 to Elevation 704) of fill contains glass, wood and other debris. The following five feet (Elevation 704 to Elevation 699) of fill contains glass and wood debris. There are no other indications of contaminated soils or groundwater in this boring.

Boring ST-8. The top four feet (Elevation 714 to Elevation 710) of this boring is fill. The following ten feet (Elevation 710 to Elevation 700) of fill contains some wood. There are no other indications of contaminated soils or groundwater in this boring.

Boring ST-10. This boring is fill with wood and glass from the existing ground surface (Elevation 715) to the original ground surface (Elevation 697). There are no other indications of contaminated soils or groundwater in this boring.

Boring ST-11. The top 14 feet (Elevation 726 to Elevation 712) is dump fill with traces of wood. A layer of wood was noted at a depth of 18 feet (Elevation 708). The materials from 18 to 26 feet (Elevation 708 to 700) are fill. There are no other indications of contaminated soils or groundwater in this boring.

Proposed Carver County Government Center

Soil borings were advanced in the area of the proposed Carver County Government Center in June 1989 by Twin City Testing Corporation for the purpose of designing foundations to support the proposed structures. The locations of these borings are indicated in Figure 31.

Borings B-12, B-13, B-15, B-17, B-27, and B-30 indicate a significant amount of debris fill from the ground surface to approximately Elevation 700 (or the approximate elevation of the natural soils at the location of the boring), including wood, metal, glass, cinders, and ashes. These five borings are located adjacent to the wastewater treatment plant, where soil borings also indicate debris fill. Borings B-15 and B-27 also include metal and wood. It appears likely that the fill at these two borings is associated with the backfill for a sanitary sewer on the site. The remainder of the borings towards the North (away from the flood control project and away from the treatment plant) consist of a mineral soil fill with traces of brick. The source of the bricks in this area may be a brick factory which previously existed at or near the site or demolition debris. Borings B-2, B-4, B-10, B-28, B-29, and B-34 note indications of brick. Other borings containing suspect materials are discussed below.

Boring B-12. The top 24 feet of this boring (Elevation 724 to Elevation 700) is fill containing concrete, brick, wood, metal, glass, and cobbles. There are no other indications of contaminated soils or groundwater in this boring.

Boring B-13. The top 23 feet of this boring (Elevation 722 to Elevation 699) is fill containing concrete, metal, brick, glass, and wood. There are no other indications of contaminated soils or groundwater in this boring.

Boring B-15. The top 9 feet of this boring (Elevation 721 to Elevation 712) is fill containing brick and metal. There are no other indications of contaminated soils or groundwater in this boring.

Boring B-17. The top 9 feet of this boring (Elevation 722 to Elevation 713) is fill containing brick and metal. The next 9 feet of this boring (Elevation 713 to Elevation 704) is fill containing brick, wood, and cinders. There are no other indications of contaminated soils or groundwater in this boring.

Boring B-27. The top 21 feet of this boring (Elevation 721 to Elevation 700) is fill containing brick, metal, and wood. A sanitary sewer was encountered at Elevation 700. There are no other indications of contaminated soils or groundwater in this boring.

Boring B-30. From a depth of 7 feet to a depth of 9.5 feet (Elevation 719 to Elevation 716.5), this boring indicates fill containing ashes. From a depth of 9.5 feet to 12 feet (Elevation 715.5 to Elevation 714), the boring is mostly ashes. Some glass is noted between a depth of 12 feet and a depth of 16 feet (Elevation 714 to Elevation 710). There are no other indications of contaminated soils or groundwater in this boring.

Methane Gas

Explosiometer readings were recorded in borings B-11, B-12, B-13, B-15, B-17, B-25, and B-27. Readings greater than 0 percent of the lower explosive limit (LEL) were recorded in borings B-12, B-13, and B-17, which are the three borings closest to the wastewater treatment plant and the dump/burn site. Boring B-12 had a reading of 60 percent of the LEL at a depth of 10 feet (Elevation 714) and a reading of 50 percent of the LEL at a depth of 15 feet (Elevation 709). Boring B-13 had a reading of 50 percent of the LEL at a depth of 15 feet (Elevation 707). Two air samples were obtained for laboratory testing. A sample obtained at a depth of 5 feet (Elevation 719) in boring B-12 indicated a methane concentration of 32,000 parts per million (ppm). A sample obtained at a depth of 15 feet (Elevation 708) in boring B-17 indicated a methane concentration of 190 ppm.

Site Stratigraphy

Stage 3

Profiles

A profile was not developed for Stage 3. The lime pile is not considered to be an environmental concern at this time.

Cross Sections

Cross sections were not developed for Stage 3. The lime pile is not considered to be an environmental concern at this time.

Stage 4

Profiles

A profile, Figures 32 through 34, has been developed for Stage 4 to illustrate the site stratigraphy along the proposed levee. The profile section line is found in Figures 16 and 17. The stationing along the profile is the stationing along the adjacent levee control line. The profile was selected to cut through the soil borings which would most influence the levee construction. The stratigraphy of the dump fill materials, the elevations of the groundwater table, and the pre-dump original ground surface elevations are readily apparent on this profile. A discussion of this profile follows.

Debris fill exists from the existing ground surface to the pre-dump ground elevation from approximately Station 20+80 to approximately Station 28+00. At this point, the debris fill materials were placed on top of the riverward slope of the emergency levee. The slope was filled to the existing top elevation of the emergency levee.

The existing ground surface at boring 89-126M is shown to be lower than the remaining borings. This boring was advanced at the riverward toe of the debris fill slope and was included on the profile to show the riverward extent of the debris fill adjacent to the proposed levee section and to further verify the elevation of the pre-dump original ground surface. Boring 89-111M was advanced at approximately the same station as boring 89-126M, but further landward. Boring 89-111M indicates debris fill materials from the existing ground surface to approximately Elevation 699 and oily odors and sticky soils at the groundwater table.

Boring 80-25M was advanced through the emergency levee. This boring had no indications of contaminated materials or groundwater. Based on this finding, the emergency levee was either placed on the original pre-dump ground surface prior to dumping in this area or the foundation for the levee was cleared of all unsatisfactory materials prior to constructing the emergency levee. The former scenario is most likely correct.

Boring 89-110M was advanced through the existing levee on the landward side of the top of the levee. No indications of debris fill materials were noted in this boring, indicating dumping activities did not occur until after this portion of the levee was constructed; however, slight and faint solvent odors were noted at the approximate interface of the levee prism and the original ground surface and approximately 3 feet above the base of the levee. The source of the solvent odor is not known, but the elevations of the odors are at the elevation of the groundwater table and within a zone of the levee which experiences frequent fluctuations in the elevation of the groundwater table.

Boring 89-106M was also advanced through the existing levee on the landward side of the top of the levee. This boring does indicate evidence of debris fill materials. This levee is likely the embankment which supported the abandoned Chicago, Milwaukee, St. Paul, and Pacific Railroad. The embankment was likely incorporated into the Chaska levee system because of its location and apparent engineered design by the railroad. It is not clear how the debris fill materials became incorporated into this embankment. One possible scenario is that dumping occurred off of the railroad embankment during the time period between the abandonment of the railroad and the 1953 construction of the levee. The debris fill dumped on the landward side of the levee could

then have been covered with soil when the railroad embankment was raised to become part of the 1953 levee system and during post-1953 emergency raises of the levee system during flooding. This scenario is verified by the evidence of debris fill materials under the existing wastewater treatment plant, which was constructed in ****.

A further verification of this scenario exists. Records of the original levee were located in the Corps of Engineers Chaska Flood Control Project Geotechnical Engineering files. The original levee was constructed in the winter of 1952, with completion by the spring of 1953. Construction records indicate that during grubbing operations for the levee, an abandoned dump was encountered between the abandoned railroad line and the Maple Street pumping station (approximately Station 34+00 to Station 40+00). Funds were not available to excavate the dump site; therefore the riverward side slopes were flattened to a 1V on 4H slope to account for potential instabilities due to a poor foundation for the levee.

Boring 79-12M was advanced at the toe of the slope on the landward side of the levee. The top eight feet of this boring is cinders and debris fill. Since this boring is located outside of the levee prism and lies within the reach described as an abandoned dump during the 1953 construction of the levee, the ground surface in this area is probably the maximum elevation of dumping between the abandon railroad and the Maple Street pumping station prior to the construction of the levee in 1953.

Cross Sections

The logs of borings advanced by the Corps of Engineers indicating evidence of contaminated soils and/or groundwater have been drawn on the appropriate cross sections, Figures 35 through 40. These sections illustrate the typical proposed levee being constructed directly on the dump fill materials. The elevations of the groundwater table, the original pre-dump ground surface, and the various odors noted on the field logs are readily apparent on these sections.

The cross sections included in this report are typical cross sections taken from the Chaska Stage 4 Plans and Specifications drawings developed to date. Typical sections, as the name implies, cover a reach of a project having similar construction features. The actual cross section which is drawn is from a specific station included in the project reach covered by the typical section. The boring logs which are included on the typical sections may not agree with the cross section regarding ground surface elevations, etc., because the boring was most likely not advanced at the same station for which the section was drawn. To minimize interpretational discrepancies by readers of this report, the debris fill and levee fill units shown on the profile are not sketched on the cross sections. The sections are included to illustrate the construction of the levee and other project features adjacent to the contaminated areas.

In general, the cross sections indicate debris fill adjacent to the proposed levee from the existing ground surface to approximately Elevation 700 from Station 21+00 to Station 28+00 and adjacent to and below the proposed levee

raise from Station 30+00 to Station 37+00. The presence of debris fill is also illustrated more clearly where the inspection/cutoff trench, relief wells, and storm sewers are to be constructed.

The cross sections also more clearly illustrate the potential groundwater contamination at the elevation of the groundwater table in the areas where wick drains are to be installed.

Summary

Debris fill is present along the landward side of the existing and proposed levees. From approximately Station 20+80 to Station 28+00, adjacent to the proposed new levee, the new levee will be constructed on top of the debris fill. Debris fill is not expected to be encountered between approximately Station 28+00 and Station 30+00. From approximately Station 30+00 to Station 37+00, the debris fill has been covered with soil during emergency raises of the levee to prevent flooding.

Groundwater contamination is suspected at and slightly above the elevation of the groundwater table from approximately Station 23+00 to approximately Station 30+00, as evidenced by solvent odors, petroleum odors, and petroleum contaminated soils noted in soil borings 82-51M, 89-126M, 89-111M, and 89-110M.

Regulatory Database Search

Database List

United States Environmental Pollution Agency (USEPA) and Minnesota Pollution Control Agency (MPCA) database records have been reviewed to identify potential environmental liabilities at, and near, Stages 3 and 4 of the Chaska Flood Control Project. The following databases were reviewed for the purposes of this study:

U.S. Environmental Protection Agency Databases

1. National Priorities List (NPL)
2. Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS)
3. Emergency Response Notification System (ERNS)

Minnesota Pollution Control Agency Database

1. Permanent List of Priorities (PLP)
2. Regulatory Compliance, Hazardous Waste Enforcement Log
3. List of Permitted Solid Waste Facilities
4. Hazardous Waste Permit Unit Project Identification List
5. 1980 Metropolitan Area Waste Disposal Site Inventory
6. 1980 Statewide Open Dump Inventory
7. Property Transfer Technical Review Data Base
8. Underground Storage Tank Information System

Summary of Database Search

According to the MPCA Property Research Specialist, there are no sites listed in the above databases for the project property. However, several sites on the 1980 Metropolitan area Waste Disposal Site Inventory were found within one mile of the project property. The sites which are located near the Corps project are shown on Figure 1 in Appendix A.

1. Carver Dump (near the City of Carver)
2. Carver Highway Department Dump (between Edgehill Dr. and County Rd. 140)
3. American Crystal Sugar Abandoned Surface Impoundment Site (Lime settling pond, southeast of the Bierling Avenue and Bold Street intersection, 1070 Stoughton Avenue)
4. Gedneys Pickle Factory Surface Impoundment Site (between Highway 212 and 6th Street, approx. 11800 block)
5. Chaska Dump Site (between Willow Street and Beech Street, on the north side of the railroad tracks)
6. Underground Storage Tank Leaks and Spills (see Appendix F)

Engineering Considerations

Stage 3

The fill materials located between approximately Stations 2+00 and 9+00 may require disposal at sites other than a typical flood control project disposal site. The rubble materials such as plastic, metal, large pieces of concrete, and concrete slabs will require disposal at a demolition landfill permitted to accept these types of materials. The lime materials may be acceptable to dispose of as an unsatisfactory material (as defined in a typical Corps of Engineers specification), but this should be cleared with the MPCA to determine whether or not such disposal will be permitted. It is possible that the material could be stockpiled and sold for soil amendment. The use of this material will probably not be permitted on the project.

The natural materials below the lime materials are apparently decomposing. Soil borings encountered a gaseous substance venting from the borehole. The occurrence of the gas and the nature of the underlying organic soils suggests the gas is methane. This is a natural process which is not attributable to any man-made materials. Other borings in the area did not indicate venting of gas, but the use of drilling fluids may have masked the presence of the gas. The construction contractor will be made aware of the occurrence of the methane gas and its location so that the proper precautions are taken during construction in this area, but the methane gas is not expected to cause any problems during the construction of Stage 3.

Stage 4

Contaminated Materials

A definite contaminated materials area exists at the dump site, from approximately Station 20+80 to Station 28+00. Contaminated materials also exist under the existing levee from approximately Station 30+00 to Station 37+00. The raising of the levee in these areas will require the placement of new impervious fill against the exposed dump materials. Excavation and other work related to the construction of the flood control project in these areas, such as for stripping, construction of relief wells and storm sewer system pipes and manholes, installation of a wick drain system, and for a required inspection/cutoff trench, will most likely encounter materials requiring special handling, not necessarily from a contamination standpoint, but from a materials disposal standpoint, due to the nature of the materials. The installation of the wick drains and relief wells, discussed below, may encounter materials which will prohibit the advancement of the wick materials.

The MPCA has indicated that it may allow capping and venting of the dump in the areas we are constructing the levee. The proposed levee construction will use impervious fill, which should satisfy capping requirements. Venting requirements should be straightforward, but not necessarily inexpensive. The areas to the landward side of the levee which are designed to carry surface drainage will also require capping to prevent infiltration into the dump fill materials.

Groundwater

Groundwater contamination is suspected from approximately Station 23 to approximately Station 30+00.

A wick drain system is being used to strengthen the soils underlying the new portions of the levee due to the levee raise. The wick drains are used to promote rapid drainage of the foundation soils to accelerate the consolidation of the soft soils. The accelerated consolidation of the foundation soils will allow the entire levee to be constructed in a two year timeframe.

The wick drains are long pieces of a geosynthetic drainage medium which are driven into the ground on a given spacing. The material acts as a wick, draining the groundwater from the soil pores. The wicks drain vertically up into a sand layer containing horizontal strip drains, which is designed to drain to a specific discharge location, in this case the river side of the levee. Since evidence of petroleum products and solvents has been found in areas where the wick drains are to be used, the wick drain system may be required to drain to a specific location to allow for testing of the water prior to discharging the water to the river. Testing of the groundwater in these areas is required to verify areas of groundwater contamination.

A series of relief wells and an inspection/cutoff trench will be installed on the landward side of the levee starting at approximately Station 34+00. The relief wells are required to limit seepage uplift pressures at the toe of the

levee to acceptable values. Installation of relief wells RW 35 and RW 36 will require drilling in an area which contains possible suspect materials. The cutoff/inspection trench will serve as an inspection trench during construction of the levee raise and will serve to lower the seepage gradient through the levee upon completion of the levee raise. The soils in the areas of the relief wells and wick drain systems should be tested to verify the nature of the existing fill materials in this area.

Conclusions

Stage 3

The available evidence shows that, with the exception of the Crystal Sugar Factory, there has been little commercial or industrial development in the area of Stage 3 of the project. Moreover, the few commercial buildings that exist along the proposed diversion channel (along Highway 17) do not present any potential for contamination.

As a result of this study, one site has been identified as having minor potential for contamination in Stage 3 of the Chaska Flood Control Project. This site is located about 50 feet downstream from the settling pond/berm, but this site is not within the current proposed channel alignment.

Based on the available information, it appears that the settling pond or berm associated with the former operations of the Crystal Sugar Plant does not present a potential for contaminants or hazardous-toxic wastes, as the material used to fill the pond consisted of organic wastes from sugar processing operations. The lime material may pose a potential materials disposal problem for the Corps of Engineers. Methane gas will most likely be encountered during excavation in the vicinity of the lime pile at the downstream end of the diversion channel.

Stage 4

The available historical evidence shows that the portion of Chaska along the levee between Spruce and Beech Streets in the City of Chaska has never been developed for other than residential use. No businesses, neither retail nor manufacturing, were located along the levee between these streets (within at least one city block) since Chaska was settled in the 1850's. Therefore, it is highly unlikely that any hazardous/toxic sites exist within this portion of Stage 4 of the Chaska Flood Control Project.

The existing historic literature does not provide any information about the reach of Stage 4 in the area of Courthouse Lake. Information about this area was obtained via field reconnaissance and information from the City of Chaska, Corps of Engineers Geotechnical Engineering files, and others.

Soil borings advanced to complete the geotechnical design for Stage 4 indicate dump fill materials from approximately Station 21+00 to Station 37+00. Petroleum products and solvent odors were also evident in the borings in this

area. Soil borings advanced for the design of expansions to the wastewater treatment plant and the proposed Carver County Government Center also indicate dump or debris fill materials, as well as evidence of methane gas. Although the solutions to these potential contamination problems are straightforward, such solutions are atypical of work associated with a Corps of Engineers Flood Control Project.

Summary

As a result of this Phase I Contaminated Materials and Groundwater Investigation, only one site on Stages 3 and 4 of the Chaska Flood Control Project, the former burn/dump site, located between Courthouse Lake and the Minnesota River, has been identified as having a potential for encountering contaminated materials and/or groundwater during construction.

Recommendations

Stage 3

If the final alignment for the outlet channel is shifted downstream on the Minnesota River, testing the area for contaminants is recommended. At this time, however, additional investigations for Stage 3 are required only to identify the quantity of lime materials to be disposed of, to verify that the beet processing residue does not pose an environmental concern, and to verify that the gas encountered in soil boring 92-173M is methane. This information could be obtained during the subsurface investigation to be completed as part of the final design of Stage 3. As such, a Phase II Investigation is not recommended for Stage 3 at this time.

Stage 4

A Phase II Investigation is recommended for Stage 4. The Phase II Investigation should include sampling of the groundwater along the new levee alignment and along the levee raise alignment where wick drains and relief wells are to be used, in those areas where the potential for encountering groundwater contamination exists. In addition, test pits, hand auger borings, and/or shallow soil borings should be used to verify the nature of the materials to be encountered during excavation of the inspection/cutoff trench and installation of the relief wells, manholes, and storm sewers in the areas suspected to contain contaminated materials.

The Phase II Investigation should extend from approximately Station 12+00, where a surface sheen was noted during the May 11, 1992 field reconnaissance trip, to approximately Station 37+00. Soil boring 79-12M, located at Station 35+75, indicated potentially contaminated materials. Soil boring 89-122M, located at Station 36+80 did not indicate any potentially contaminated materials. Since boring 79-12M contains suspect materials and boring 89-122M does not, the Phase II work should be carried to at least Station 37+00 to cover the area between the last suspect boring and the first clean boring.

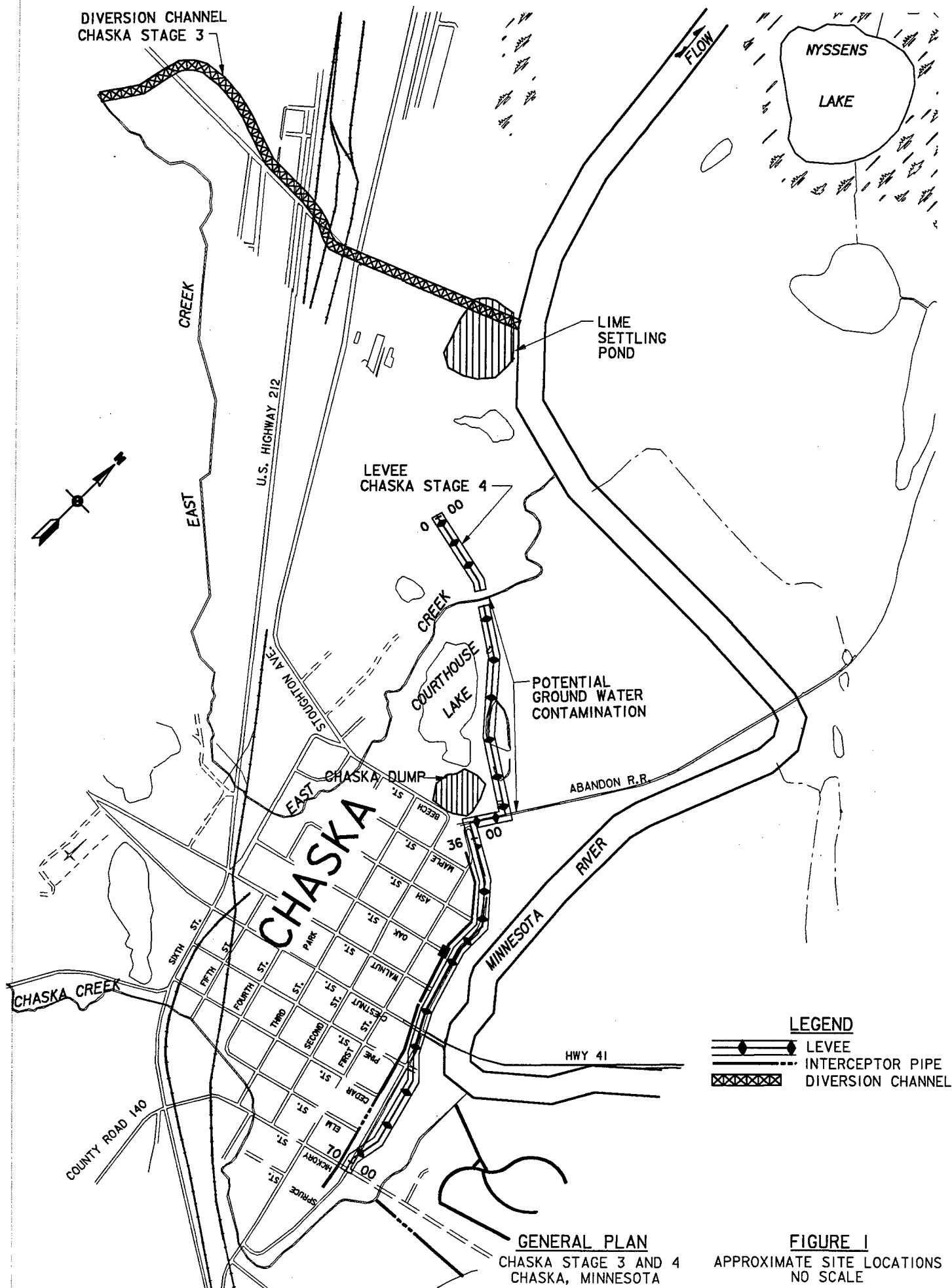
The test pits, hand auger borings, or shallow soil borings should follow the alignment of the inspection/cutoff trench and be located at the locations of the relief wells, manholes, and storm sewers in the suspect areas.

A Phase II Investigation Work Plan delineating this work will be prepared and submitted to the MPCA for approval.

Information Sources

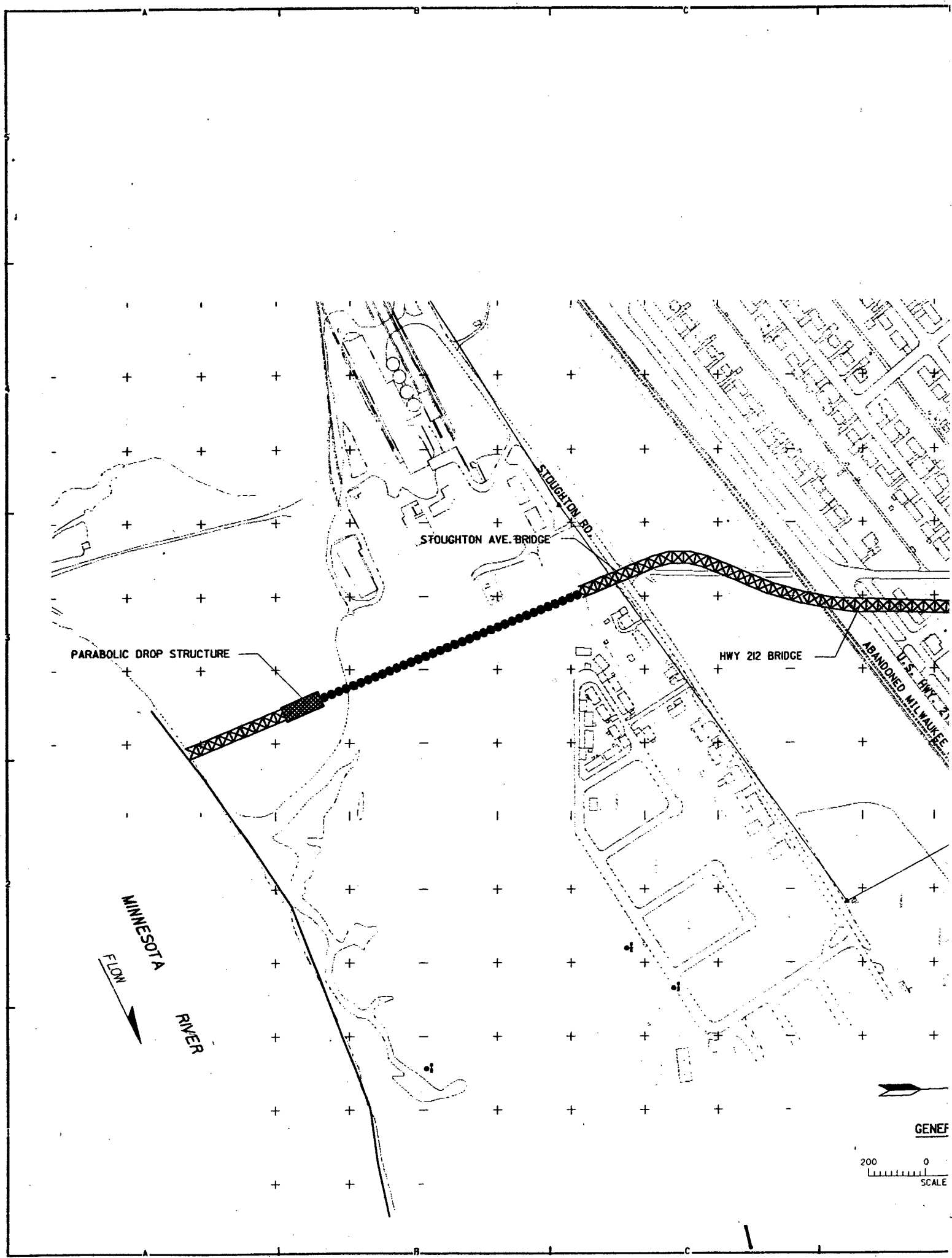
All available sources at the Minnesota Historical Society, the Carver County Historical Society, the Chaska Historical Society, the Borchert Map Library at the University of Minnesota, and the St. Paul District, Corps of Engineers, library were consulted. In addition, the City of Chaska and the American Crystal Sugar Company were asked to provide information on past land use in Stages 3 and 4.

APPENDIX A



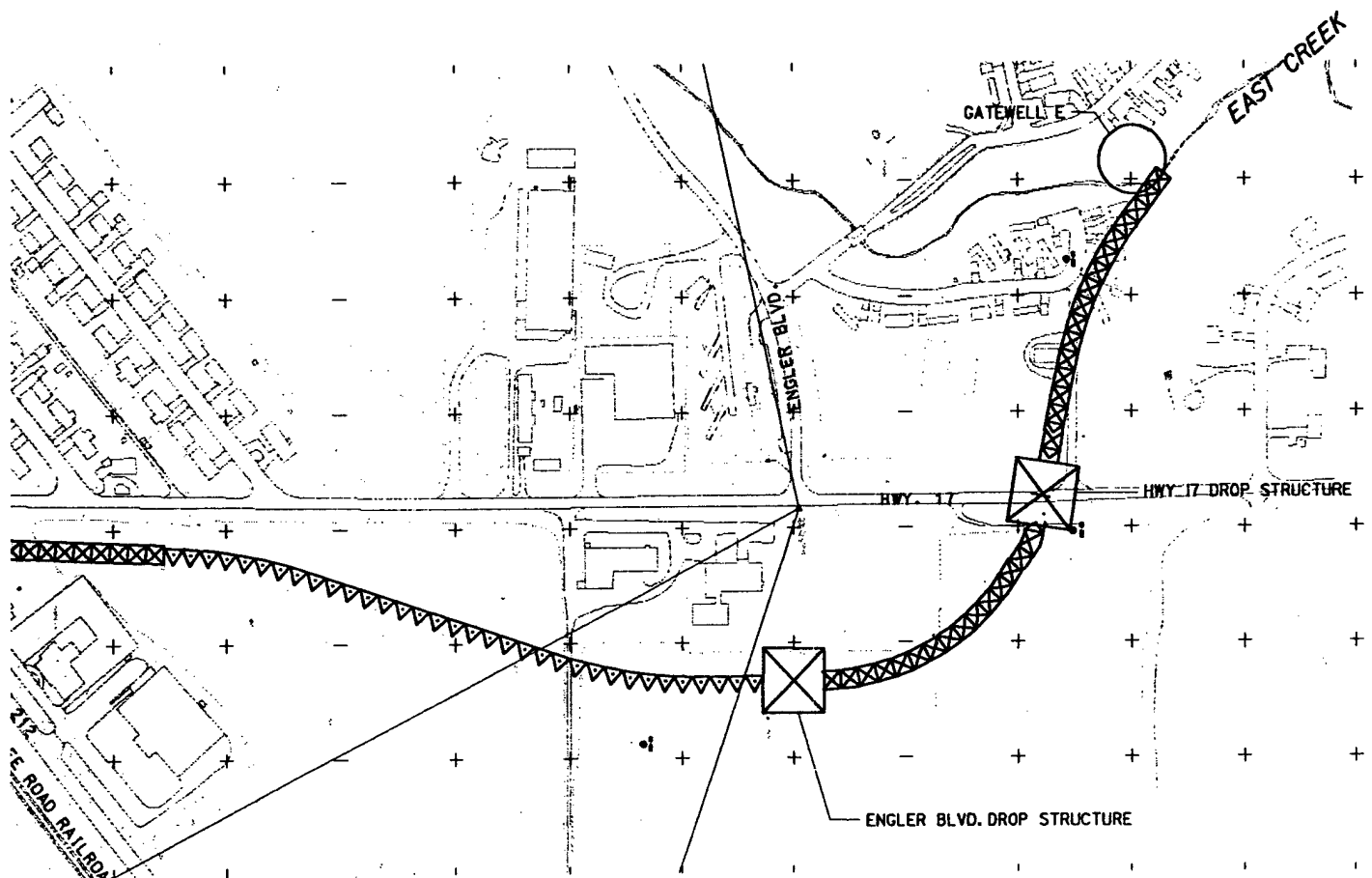
GENERAL PLAN
CHASKA STAGE 3 AND 4
CHASKA, MINNESOTA

FIGURE 1
APPROXIMATE SITE LOCATIONS
NO SCALE



GENEF

200 0
SCALE



LEGEND

DROP STRUCTURE

TRAPEZOIDAL RIPRAP CHANNEL

GRASS CHANNEL

CONCRETE CHANNEL

PARABOLIC DROP STRUCTURE

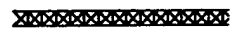
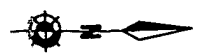


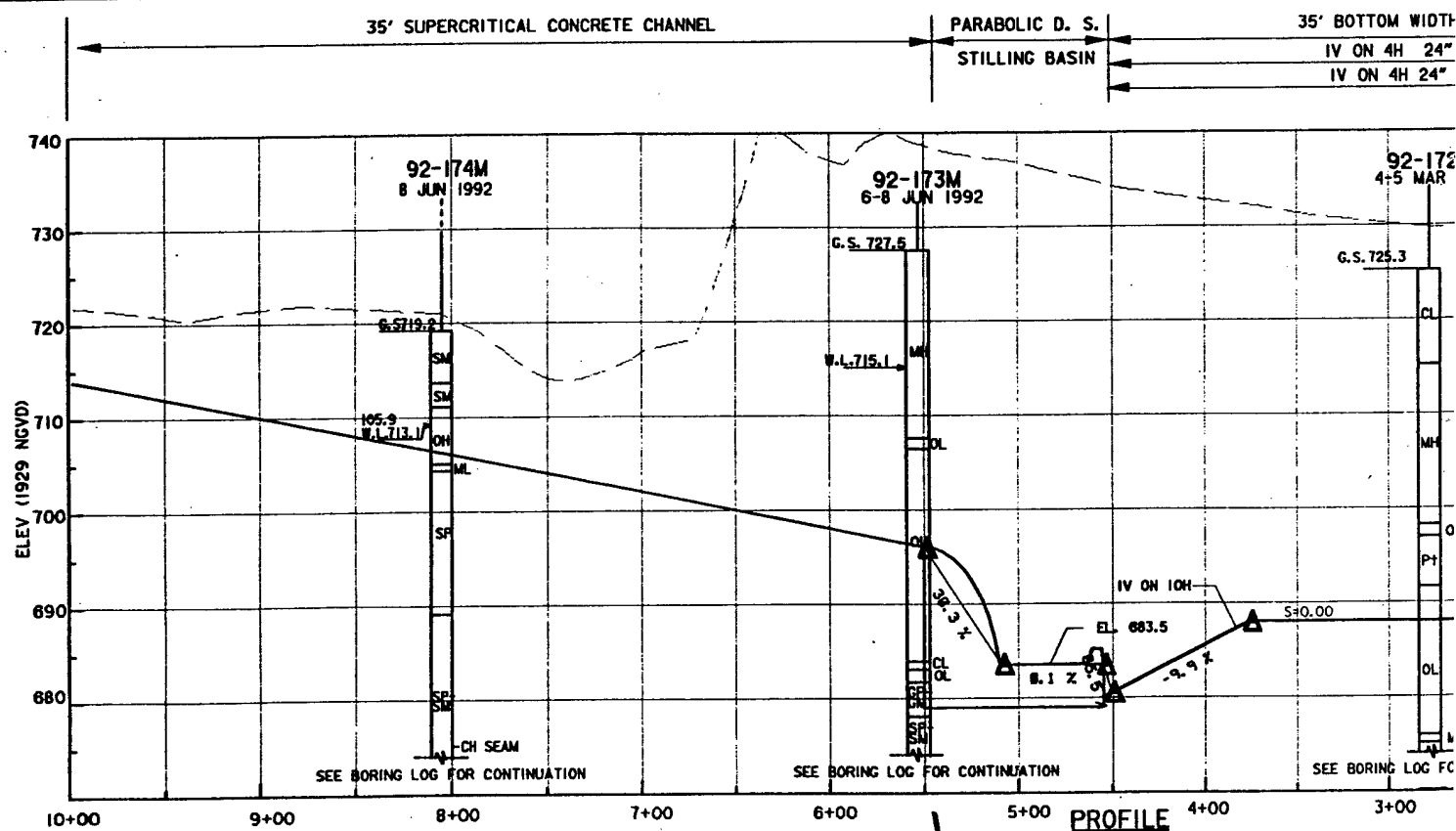
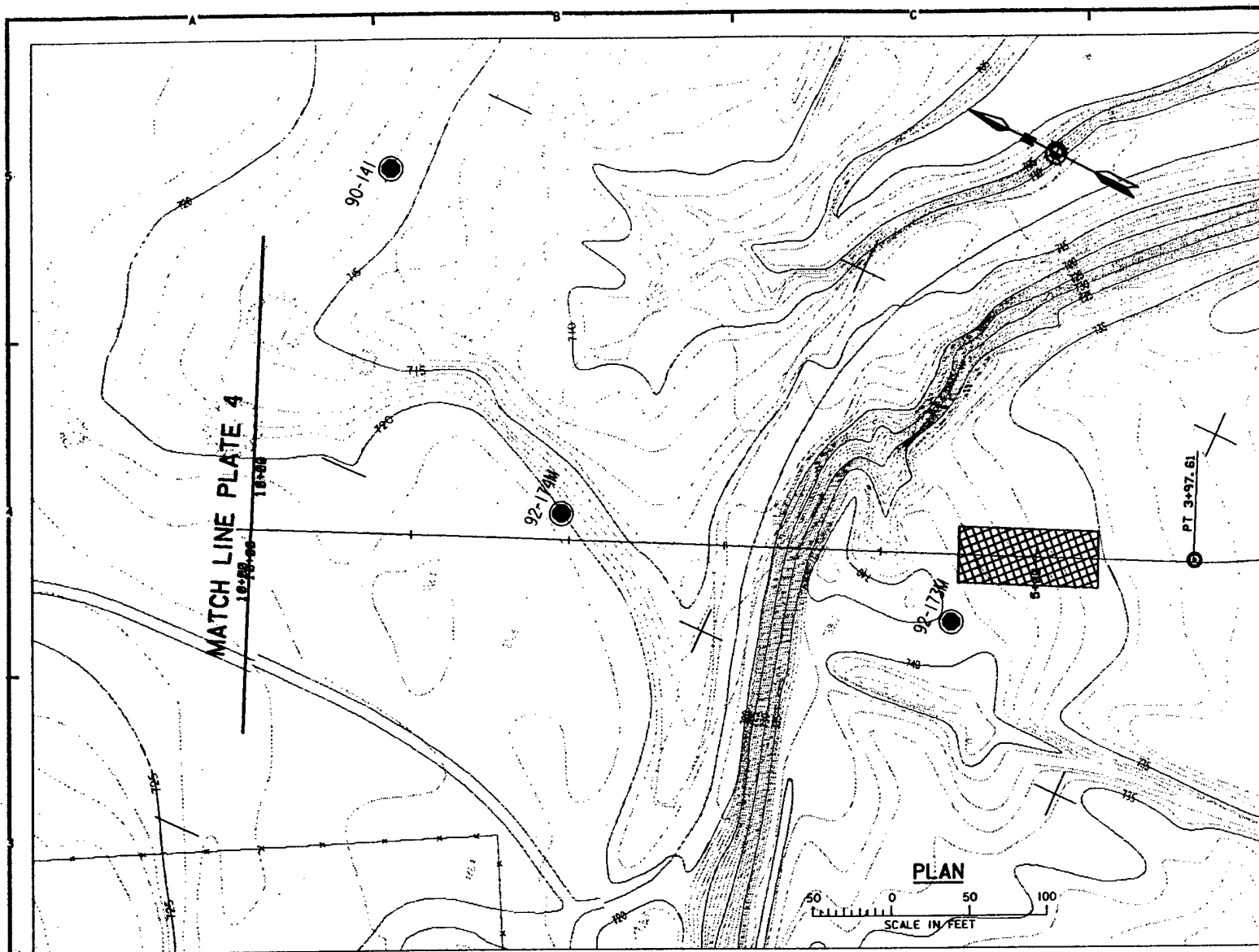
Figure 2

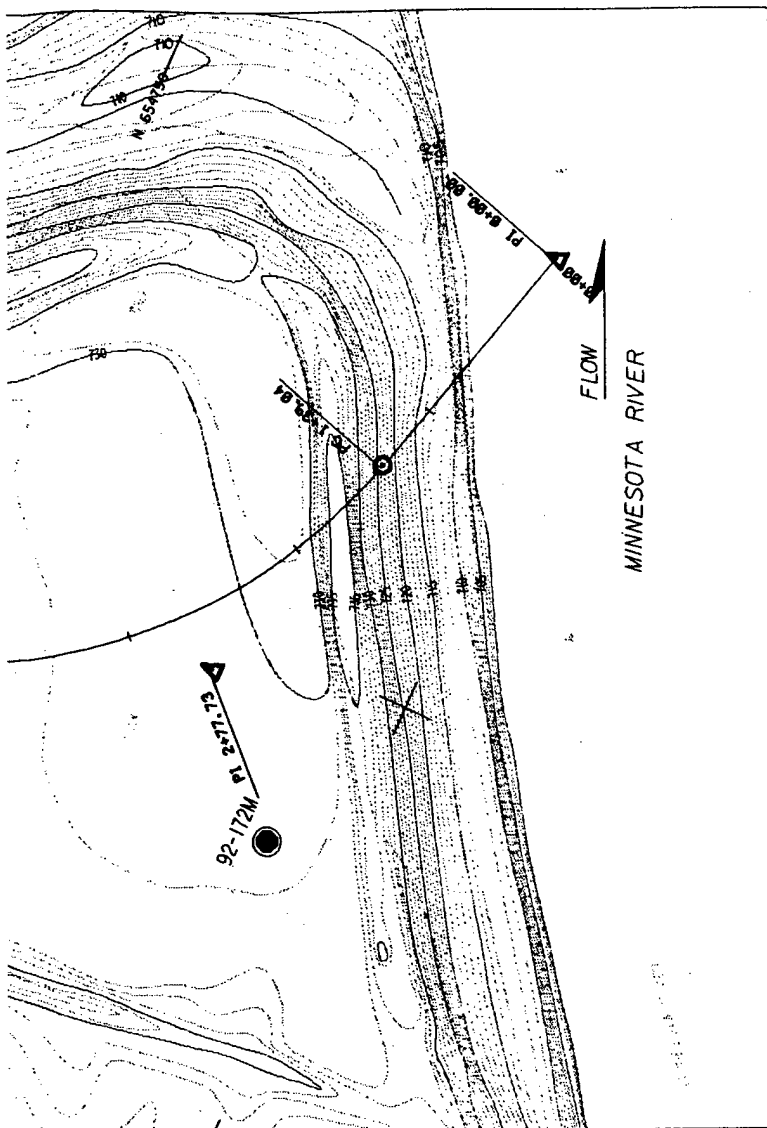


GENERAL PLAN

200 400
FEET

SYMBOL		DESCRIPTION		DATE	APPROVAL	
<p align="center">DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA</p>						
AE APPROVING OFFICIAL:		<p align="center">DESIGN MEMORANDUM CHASKA - STAGE III EAST CREEK CHASKA, MINNESOTA</p>				
DESIGNED:	TWH	<p align="center">CHASKA PROJECT FLOOD CONTROL GENERAL LAYOUT PLAN</p>				
	CHECKED:					JG
	DRAWN:					T.J.
DESIGNED:		<p>CAD FILE NAME: CH3GENPL.DGN</p>				
	CHECKED:		<p>DRAWING NUMBER: PLATE 2</p>			
	DATE: APRIL, 1992		<p>SHT OF 999</p>			
		SPEC MOD ACW37-90-B-0000				





REFERENCES:

DWG.NO.

NOTES:

7TH 77" RIPRAP
 4" RIPRAP
 1" RIPRAP

CHANNEL BOTTOM WIDTH PROTECTION
 RIGHT BANK PROTECTION
 LEFT BANK PROTECTION

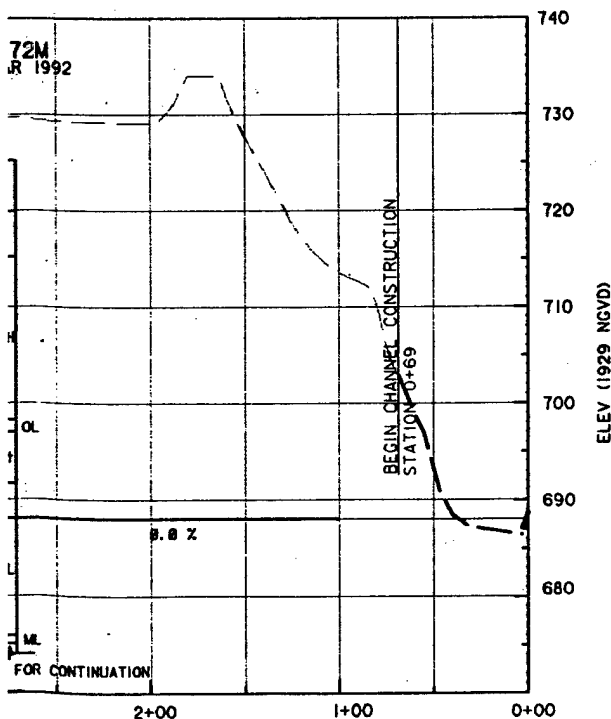


FIGURE 3

SYMBOL	DESCRIPTION	DATE	APPROVAL
<p>DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA</p>			
<p>AE APPROVING OFFICIAL:</p>		<p>DESIGN MEMORANDUM CHASKA - STAGE III EAST CREEK</p>	
<p>DESIGNED: TWH/JG CHECKED: JG DRAWN: T.J.</p>		<p>CHASKA PROJECT CHASKA, MINNESOTA</p>	
<p>DESIGNED: CHECKED: DATE: 8-28-92</p>		<p>FLOOD CONTROL PLAN & PROFILE STA. 0+00 TO 10+00</p>	
<p>CAD FILE NAME: ch3pl.dgn</p>		<p>DRAWING NUMBER: PLATE 3</p>	
<p>SPEC NO:</p>		<p>SHT X OF XX</p>	

MATCH LINE PLATE 3

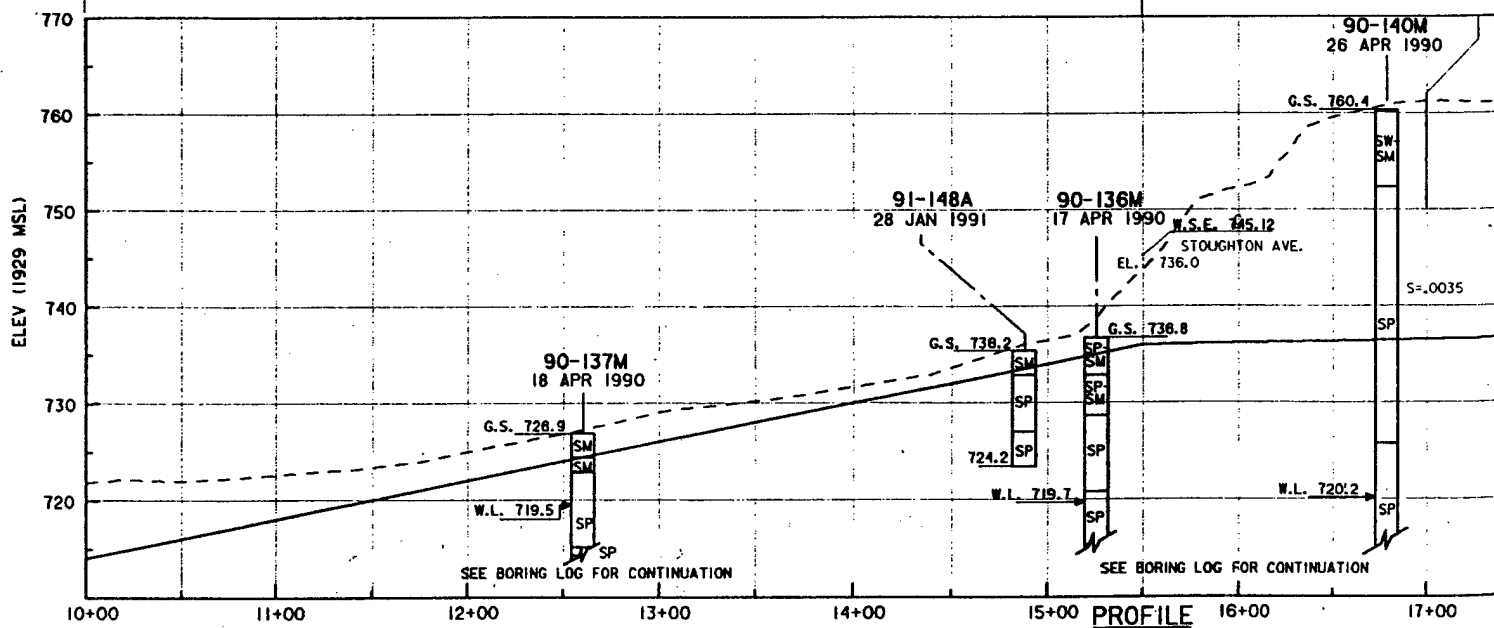
18+00

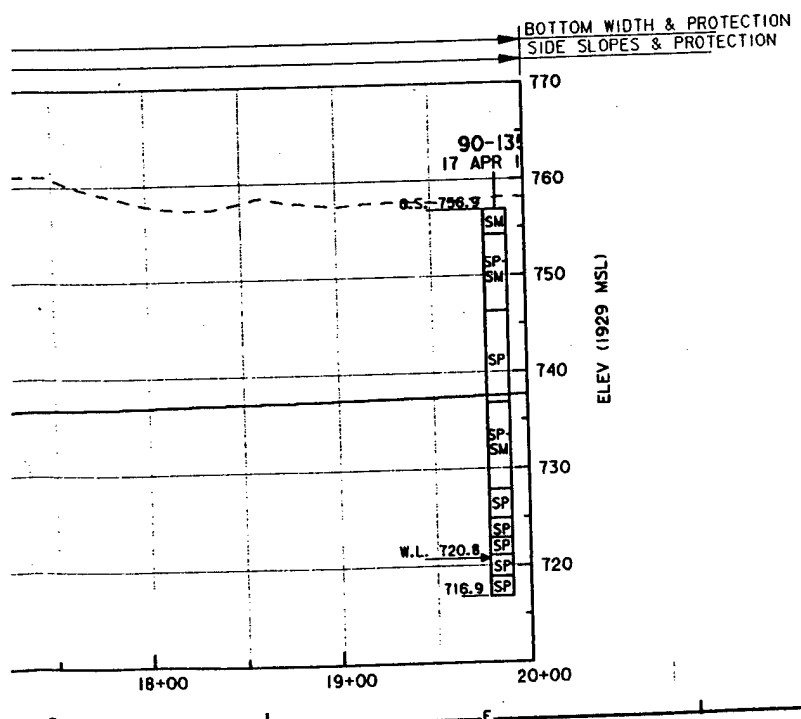
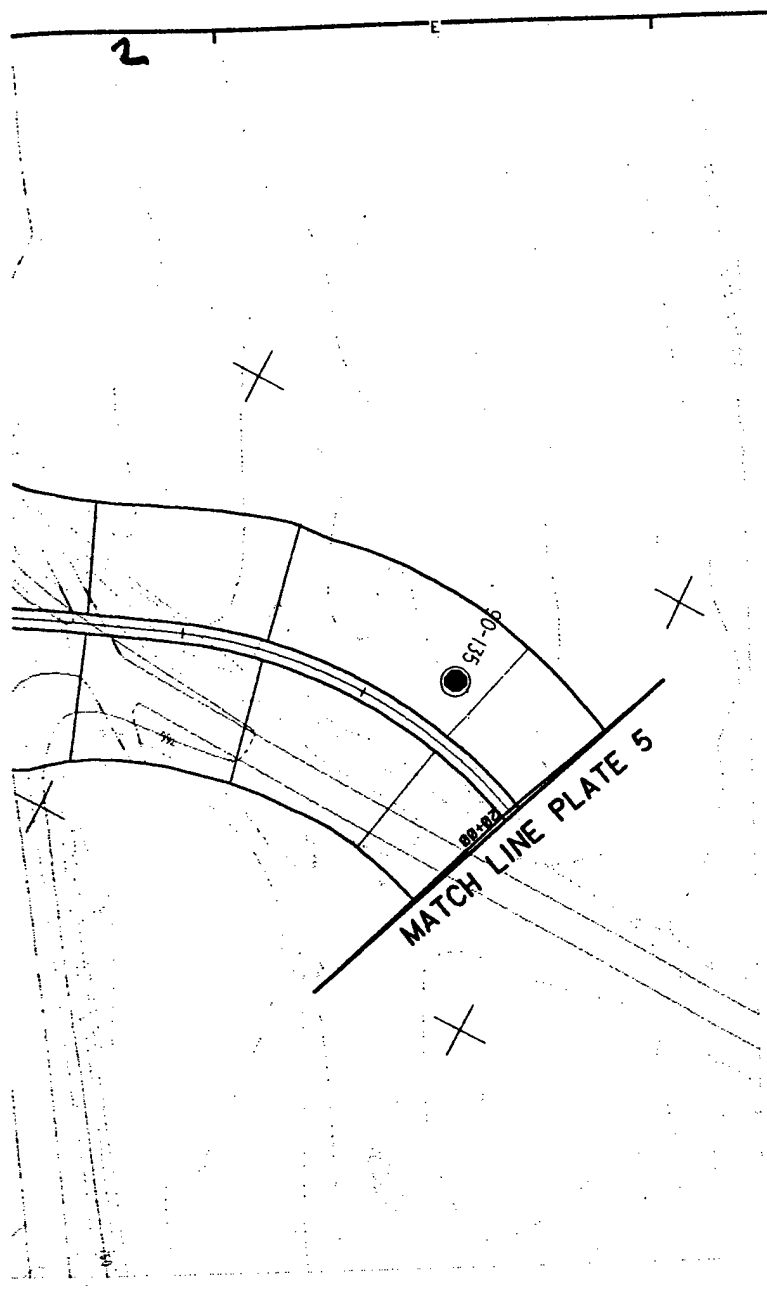
PLAN

50 0 50 100
SCALE IN FEET

35' SUPERCRITICAL CONCRETE CHANNEL

10' (RIPRAP)
IV ON 3H (RIPRAP)





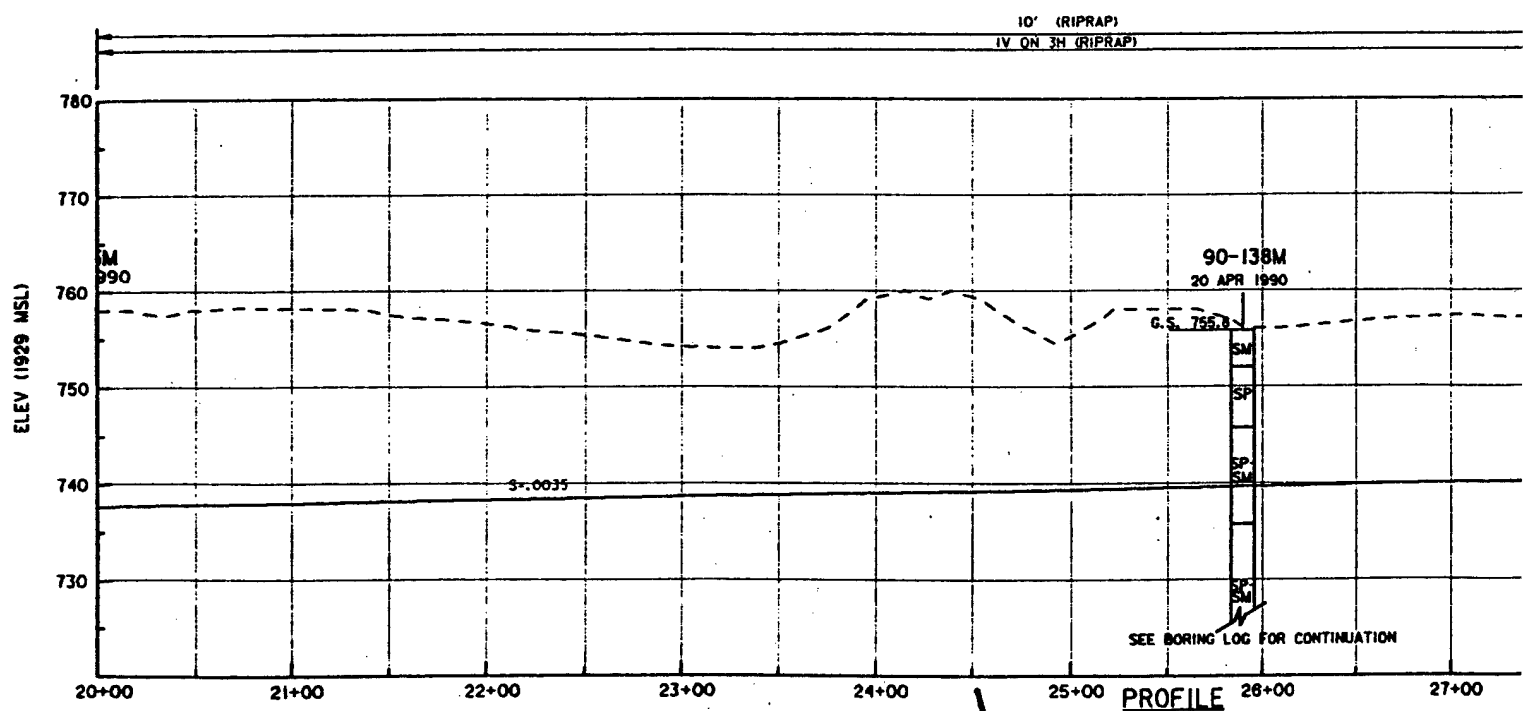
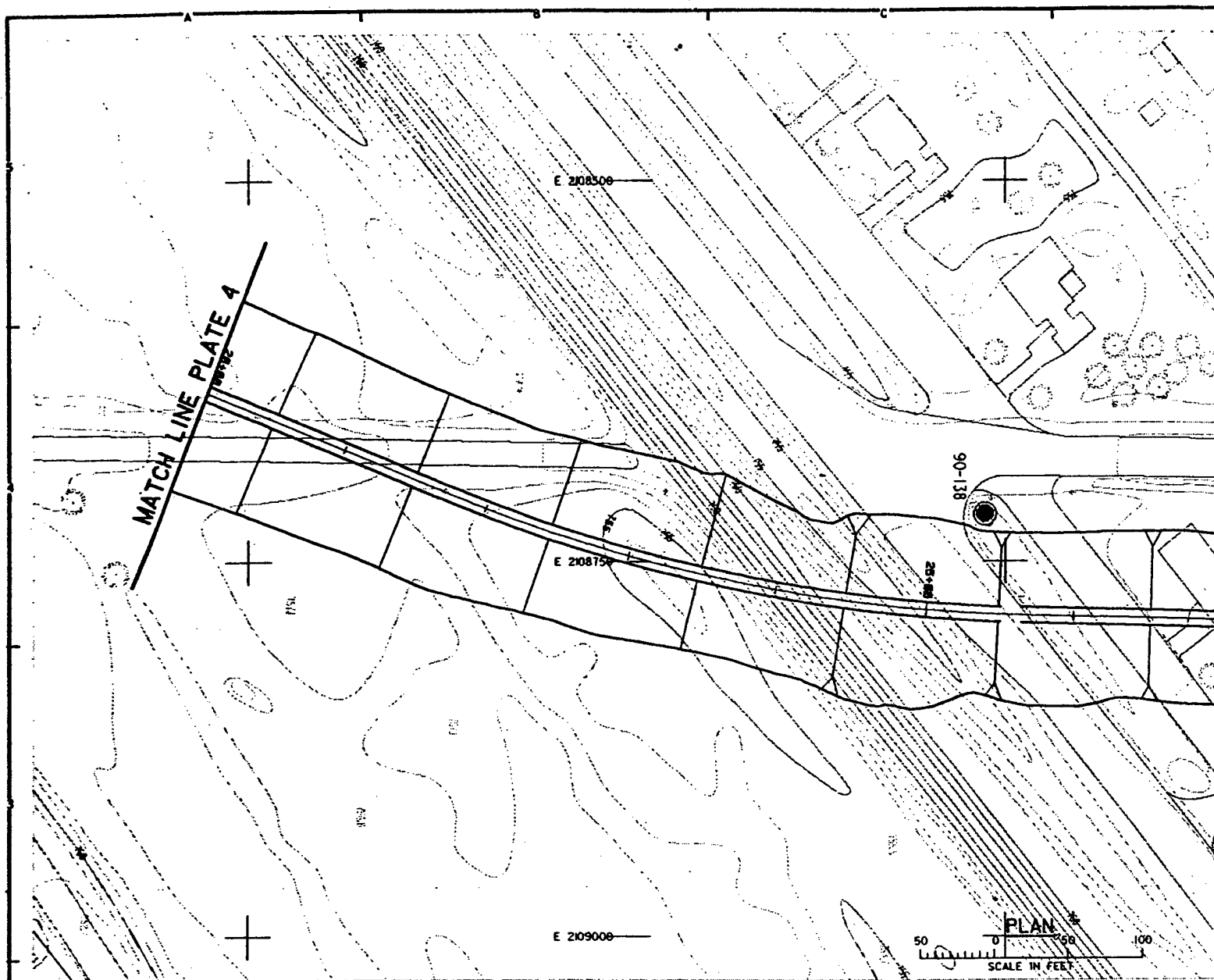
REFERENCES:

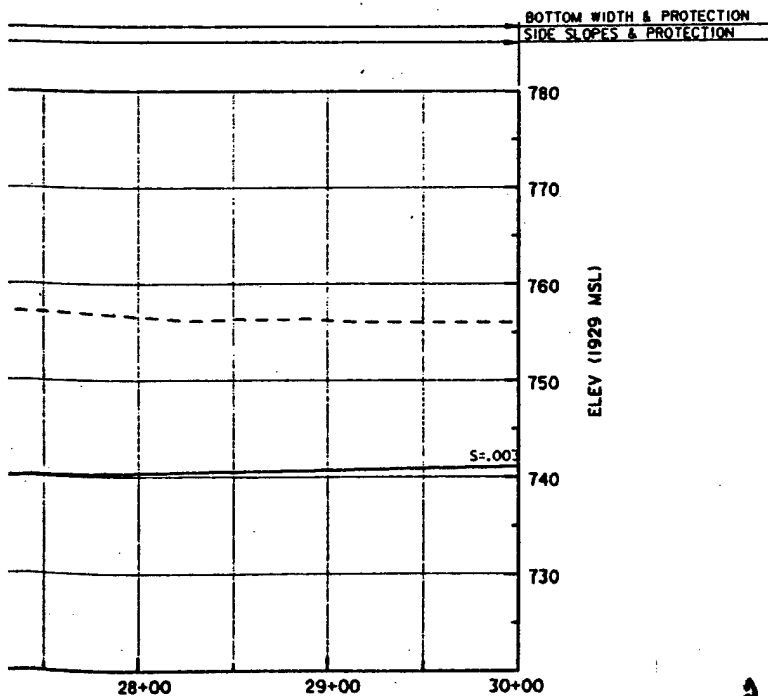
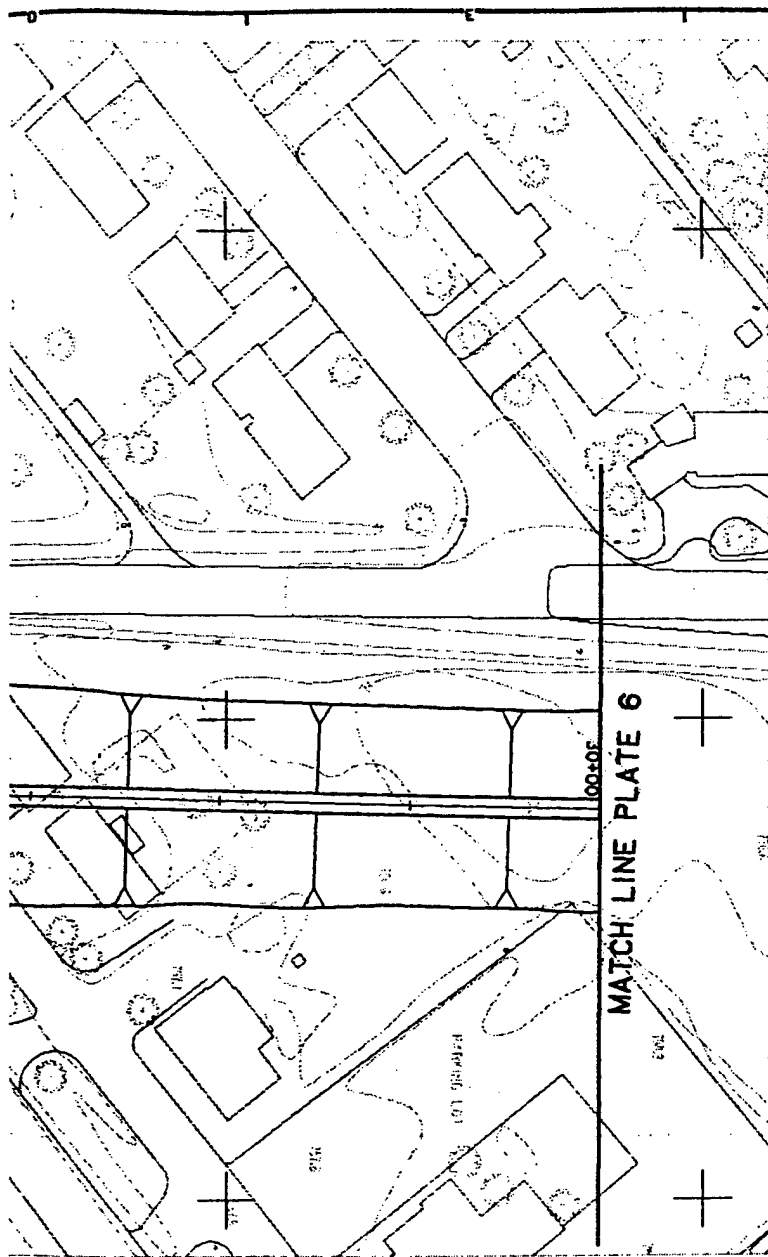
DWG.NO.

NOTES:

Figure 4

SYMBOL	DESCRIPTION	DATE	APPROVAL
<p>DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA</p>			
<p>AE APPROVING OFFICIAL:</p>		<p>DESIGN MEMORANDUM CHASKA - STAGE III EAST CREEK</p>	
<p>DESIGNED: TWH/JG CHECKED: JG DRAWN: T.J.</p>		<p>CHASKA PROJECT FLOOD CONTROL PLAN & PROFILE STA. 10+00 TO 20+00</p>	
<p>DESIGNED: CHECKED: DATE: 4-17-92</p>		<p>CAD FILE NAME: ch3pl2.dgn SPEC NO: DACW37-91-B-XXXX DRAWING NUMBER: DATE: 4-17-92</p>	
<p>ED-01</p>		<p>CHASKA, MINNESOTA PLATE 4</p>	
<p>SHT X OF XX</p>		<p>DATE: 4-17-92</p>	





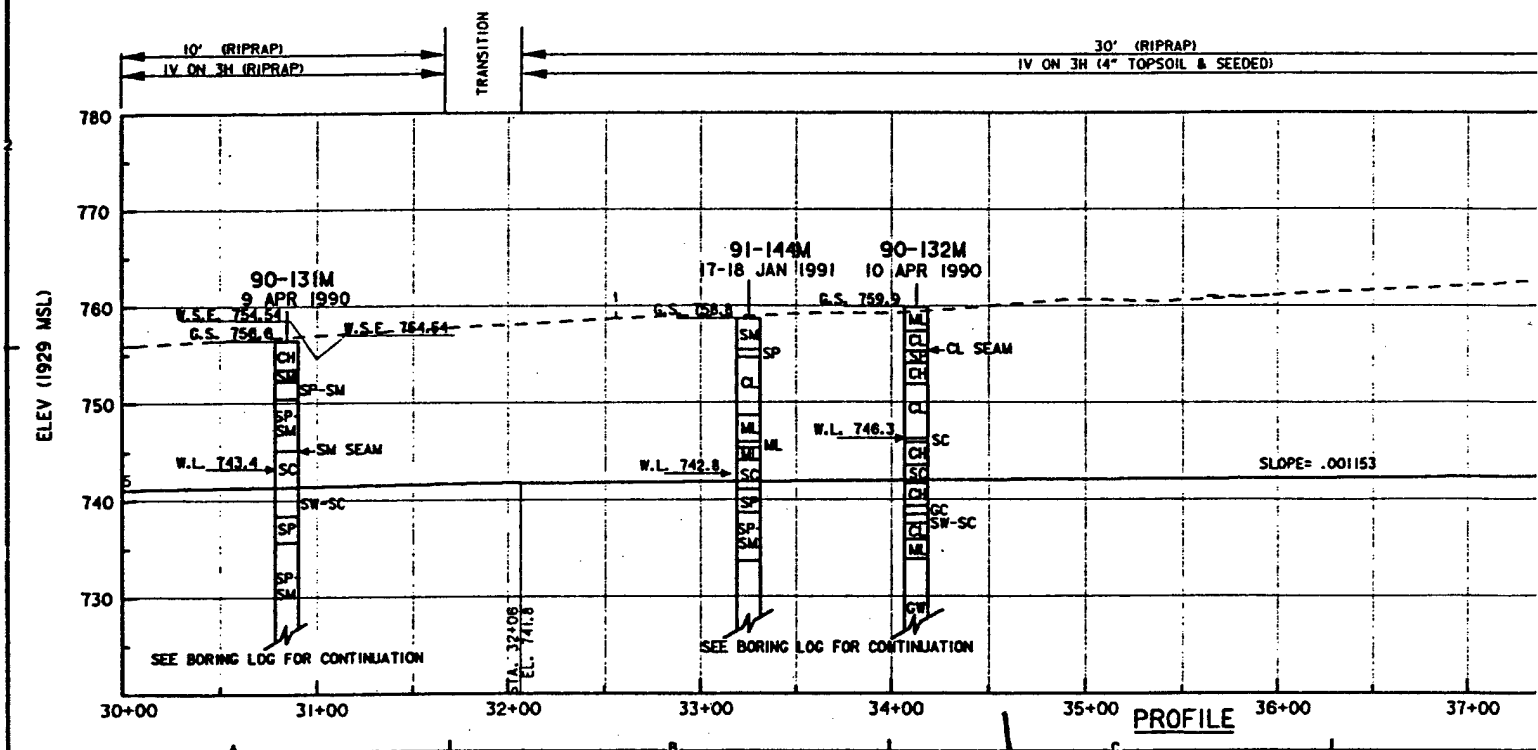
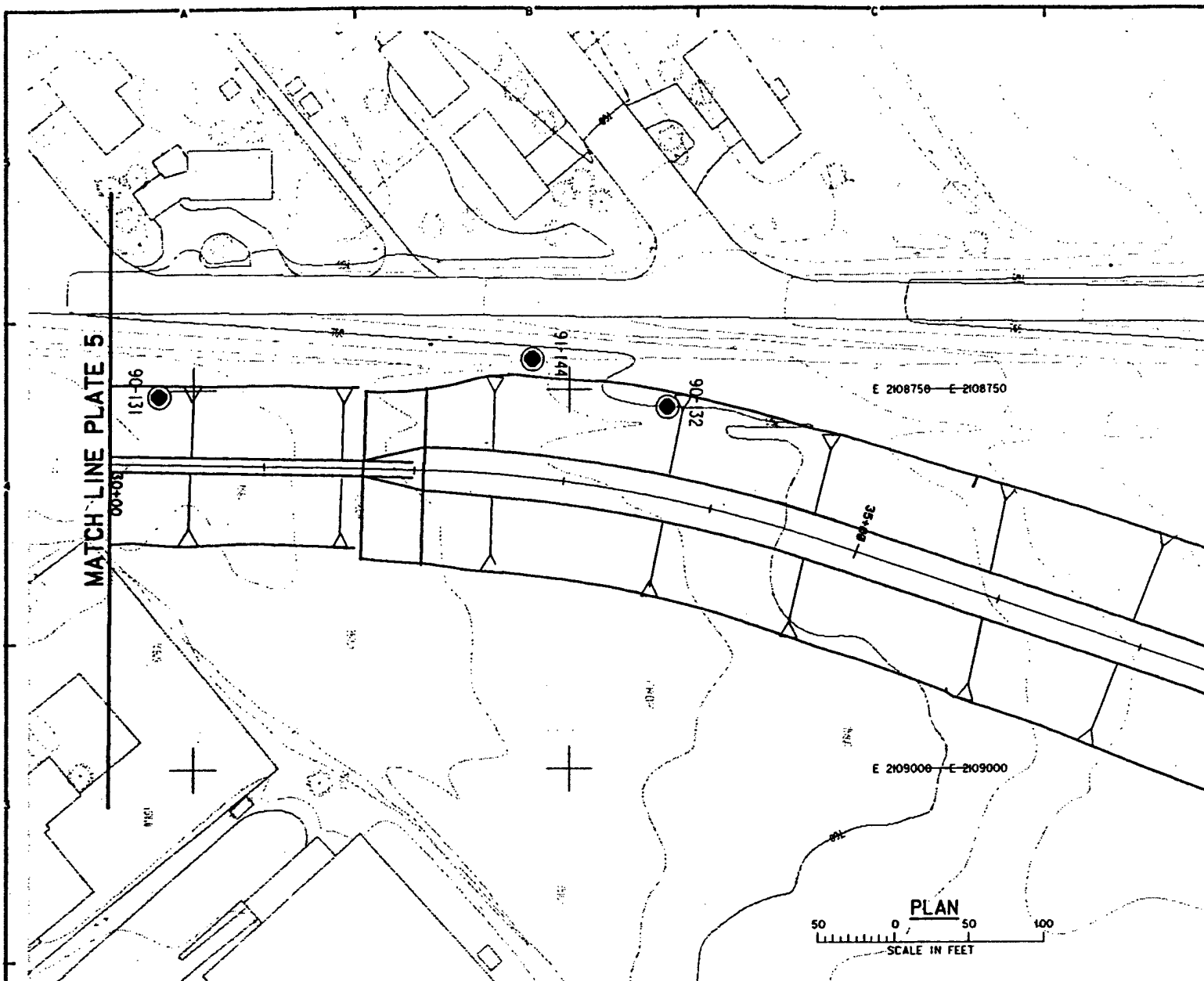
REFERENCES:

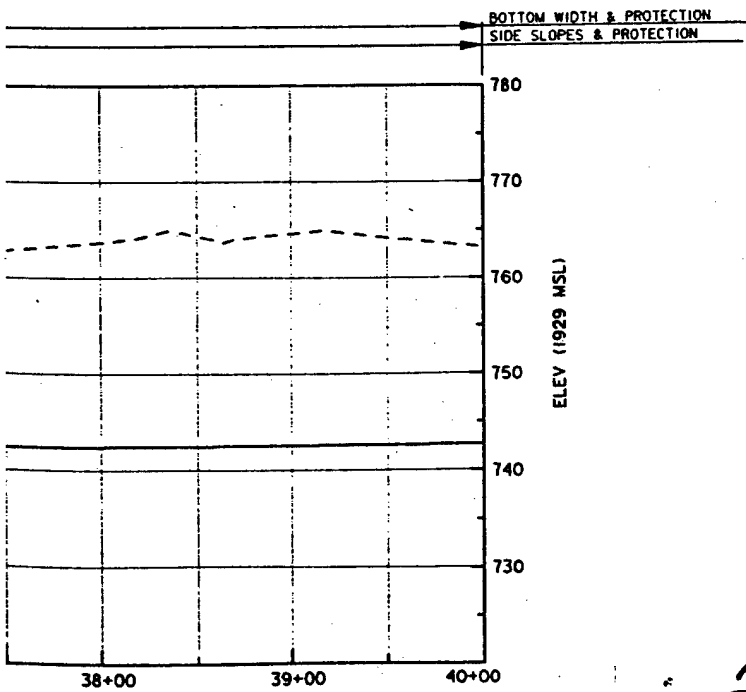
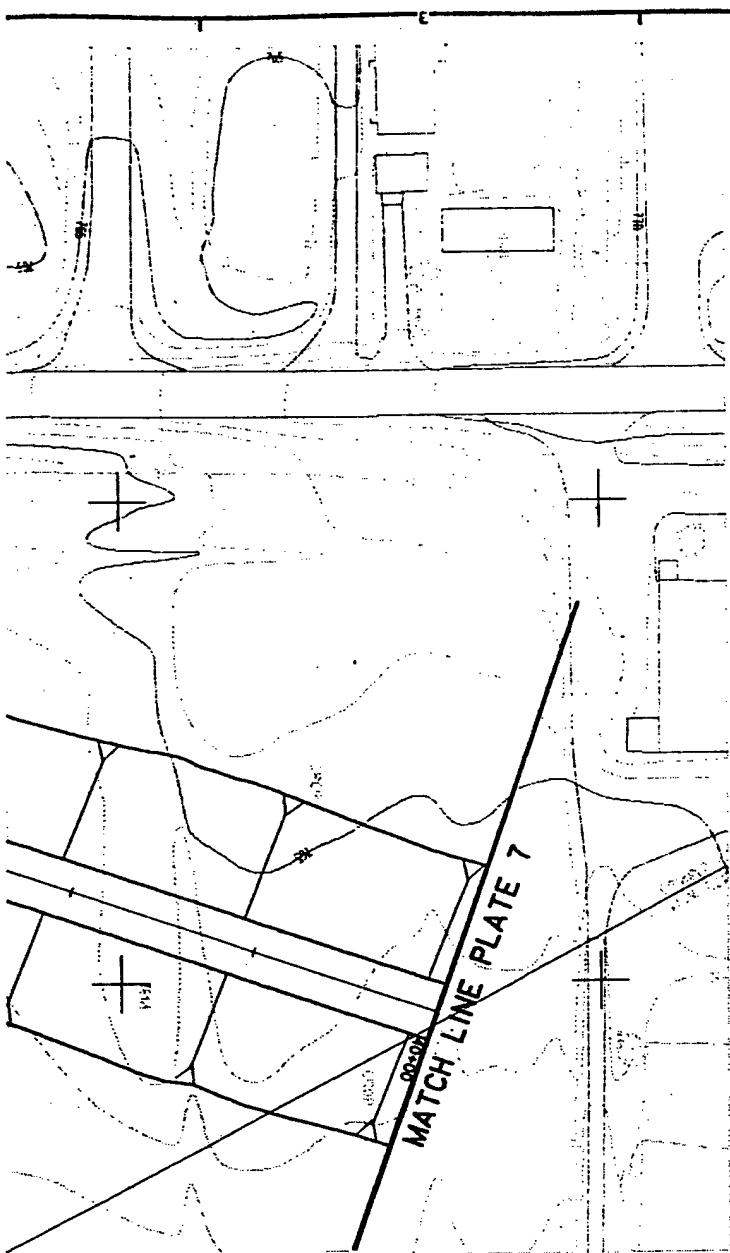
DWG. NO.

NOTES:

FIGURE 5

SYMBOL		DESCRIPTION		DATE	APPROVAL
DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA					
AE APPROVING OFFICIAL: 		DESIGN MEMORANDUM CHASKA - STAGE III EAST CREEK			
DESIGNED: TWH/JC CHECKED: JG DRAWN: T.J. DESIGNED: CHECKED: DATE: 4-17-92		CHASKA PROJECT FLOOD CONTROL PLAN & PROFILE STA. 20+00 TO 30+00 CAD FILE NAME: ch3p13.dgn SPEC NO: DACW37-9-B-XXXX			
		DRAWING NUMBER:		SHT X	OF XX
		PLATE 5			





REFERENCES:

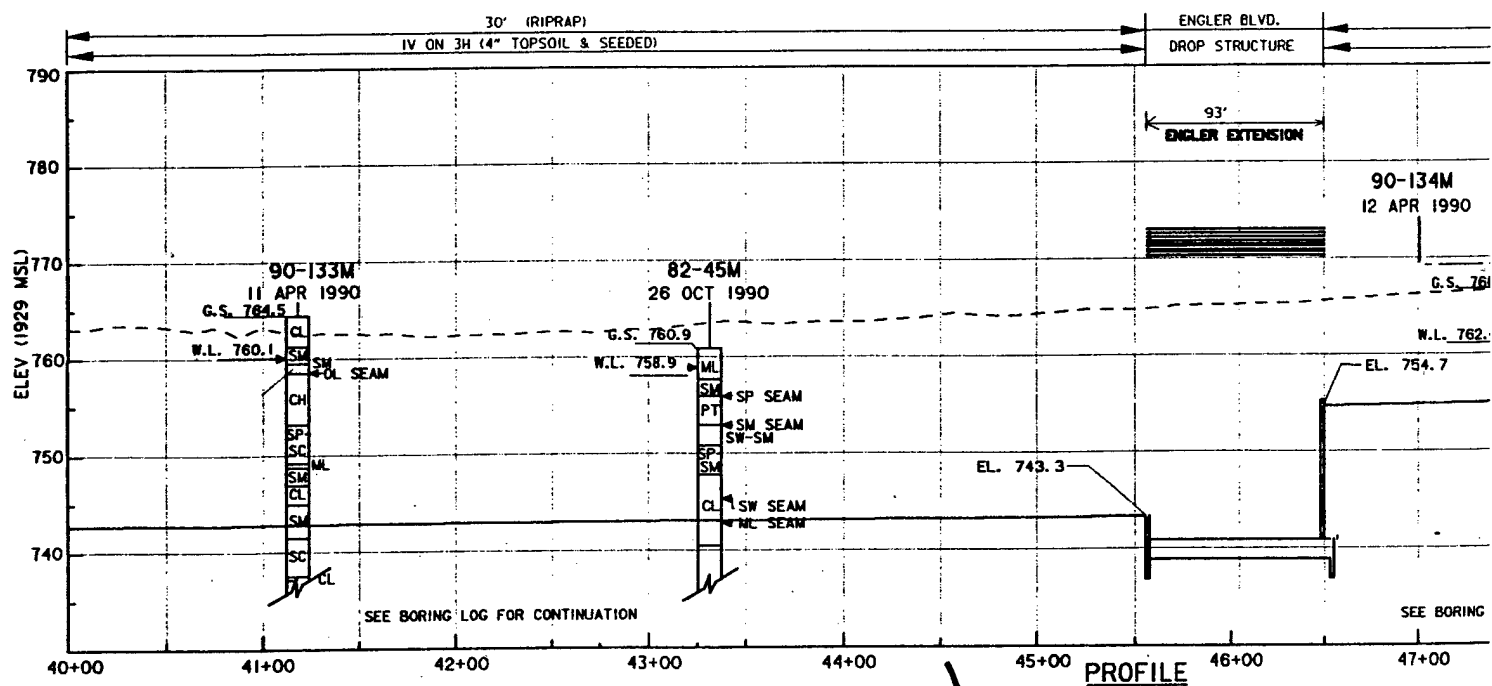
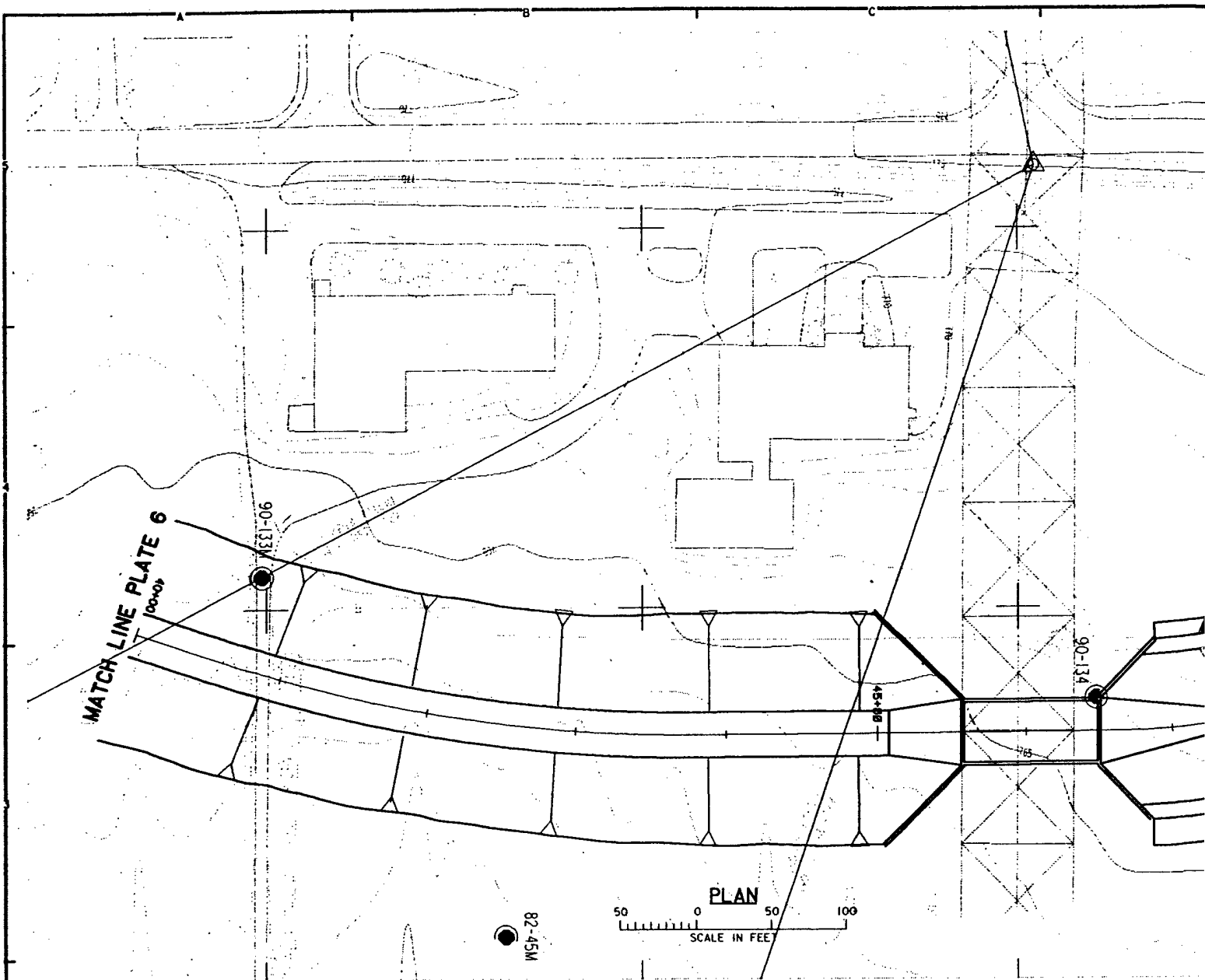
DWG.NO.

NOTES:

FIGURE 6

SYMBOL		DESCRIPTION		DATE	APPROVAL
<p align="center">DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA</p>					
AE APPROVING OFFICIAL:		<p align="center">DESIGN MEMORANDUM CHASKA - STAGE III EAST CREEK CHASKA, MINNESOTA</p>			
ED-C	DESIGNED:	TWH/JG		CHASKA PROJECT	
	CHECKED:	JG		FLOOD CONTROL	
	DRAWN:	T.J.		PLAN & PROFILE	
	DESIGNED:			STA. 30+00 TO 40+00	
DATE:	4-17-92	CAD FILE NAME:	ch3p14.dgn	DRAWING NUMBER:	PLATE 6
SPEC NO:		DACW37-91-B-XXXX		SHT X	OF XX

2

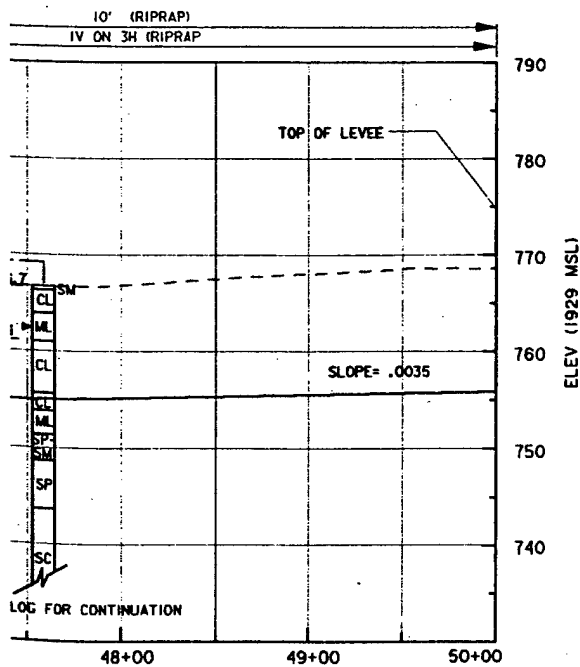


E 2108750 — E 2108750

E 2109000 — E 2109000

MATCH LINE PLATE 8

SIDE SLOPES & PROTECTION
BOTTOM WIDTH & PROTECTION



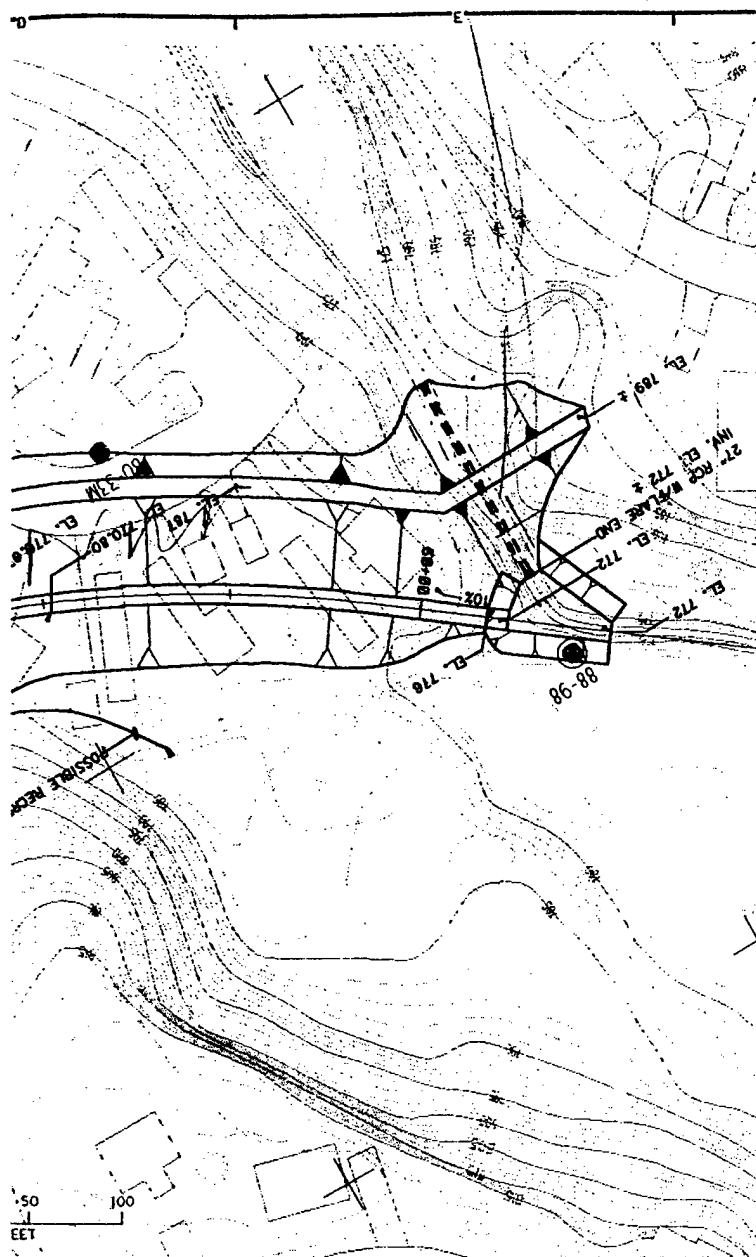
REFERENCES:

DWG.NO.

NOTES:

FIGURE 7

SYMBOL	DESCRIPTION	DATE	APPROVAL
<p>DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA</p>			
<p>AE APPROVING OFFICIAL:</p>		<p>DESIGN MEMORANDUM CHASKA - STAGE III EAST CREEK</p>	
<p>DESIGNED: TWH/JG CHECKED: JG DRAWN: T.J.</p>		<p>CHASKA PROJECT CHASKA, MINNESOTA</p>	
<p>DESIGNED: CHECKED: DATE: 4-17-92</p>		<p>FLOOD CONTROL PLAN & PROFILE STA. 40+00 TO 50+00</p>	
<p>CAD FILE NAME: ch3pi5.dgn SPEC NO: DACW37-91-B-XXXX</p>		<p>DRAWING NUMBER: PLATE 7</p>	
<p>SHT. X OF XX</p>		<p></p>	



REFERENCES:

DWG.NO.

NOTES:

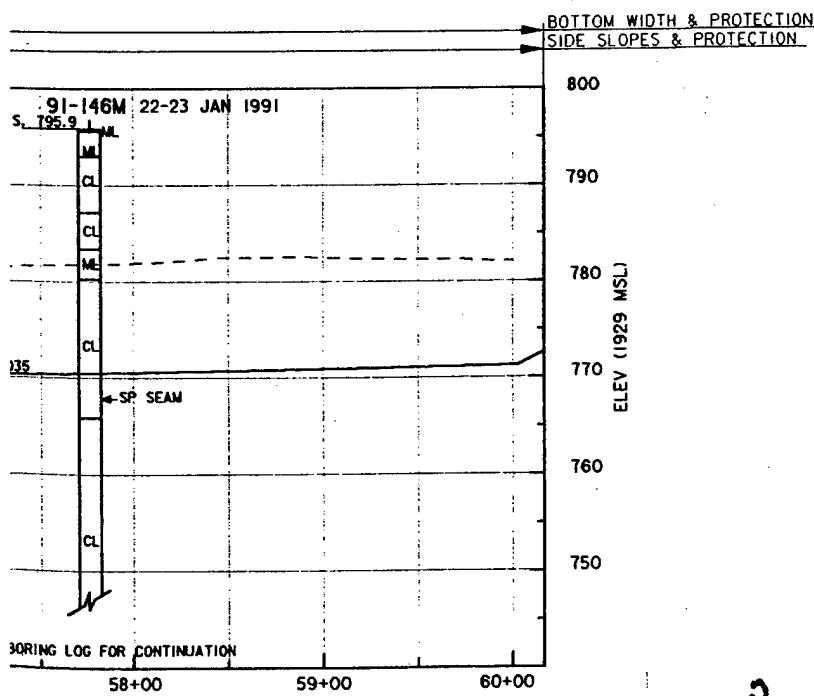
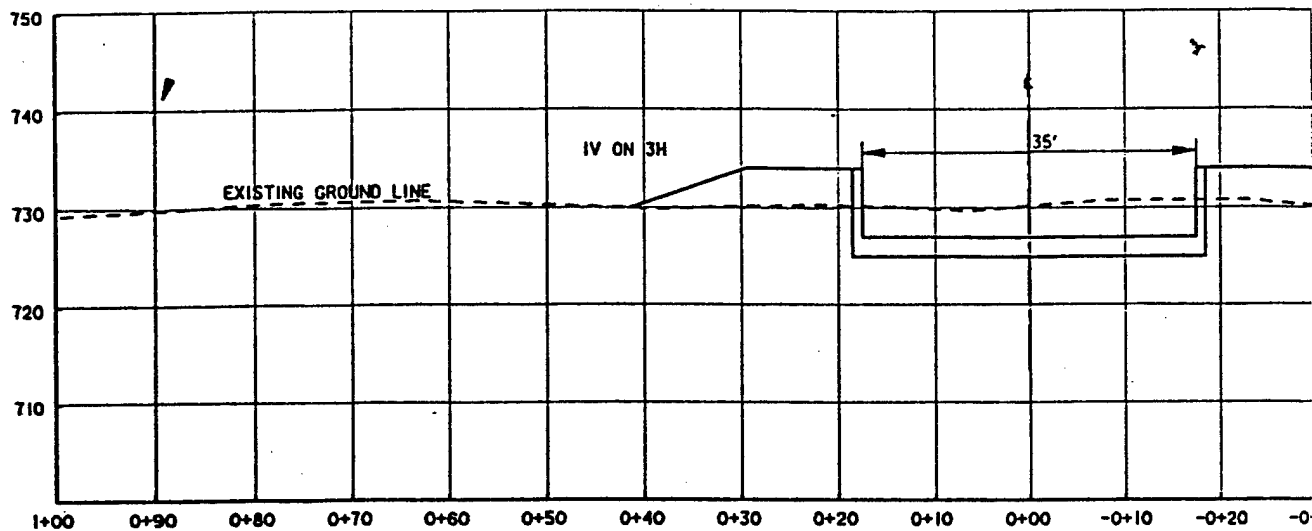


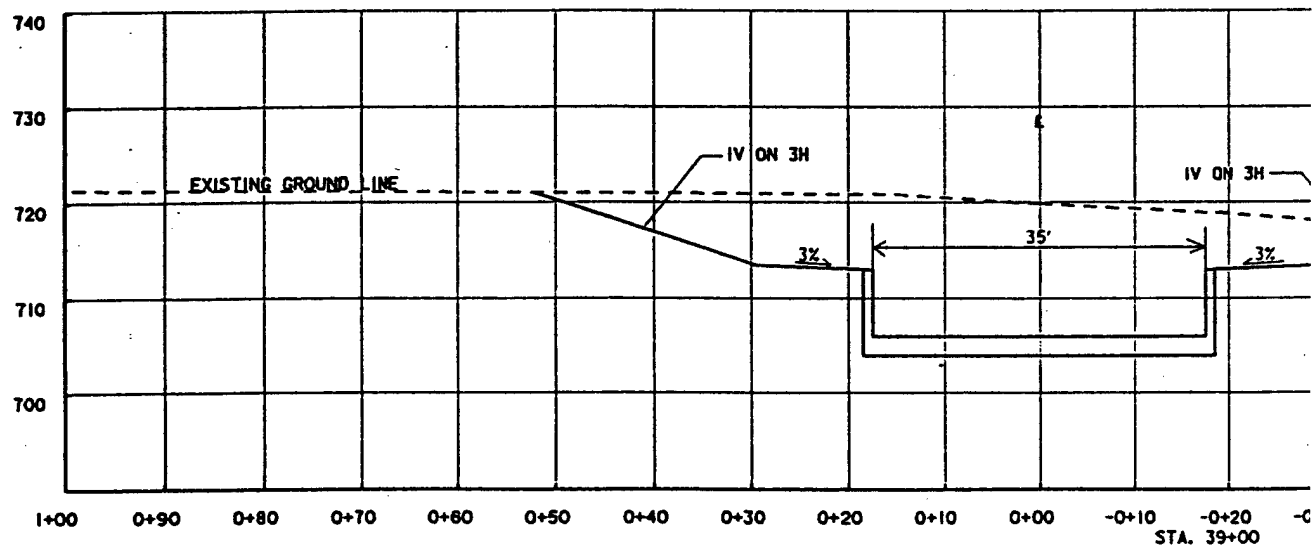
FIGURE 8

SYMBOL		DESCRIPTION		DATE	APPROVAL
<p>DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA</p>					
AE APPROVING OFFICIAL:		<p>DESIGN MEMORANDUM CHASKA - STAGE III EAST CREEK</p>			
DESIGNED: TWH/JC		CHASKA PROJECT		CHASKA, MINNESOTA	
CHECKED: JG		FLOOD CONTROL			
DRAWN: T.J.		PLAN & PROFILE			
DESIGNED:		STA. 50+00 TO 60+00			
CHECKED:		CAD FILE NAME: ch3p16.dgn		DRAWING NUMBER:	
DATE: 4-17-92		SPEC NO: DACW37-91-B-XXXX		<p>PLATE 8</p>	



G
99/999

TYPICAL SECTION
STA. 11+00 TO 14+75



H
99/999

TYPICAL SECTION
STA. 7+00 TO 10+00

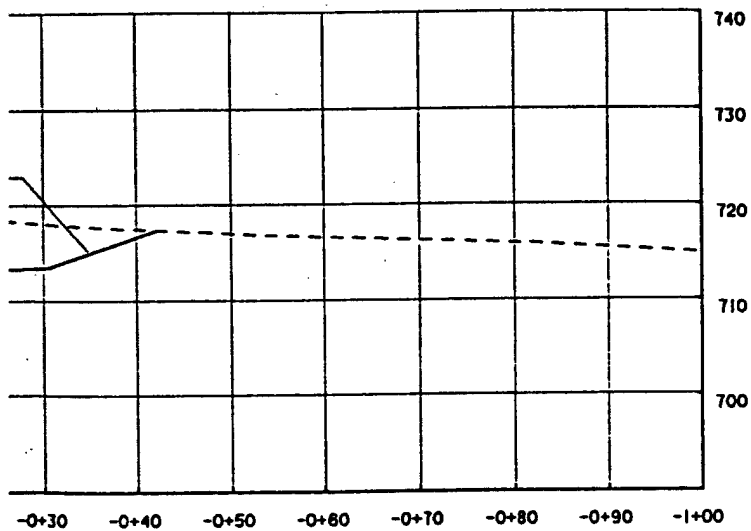
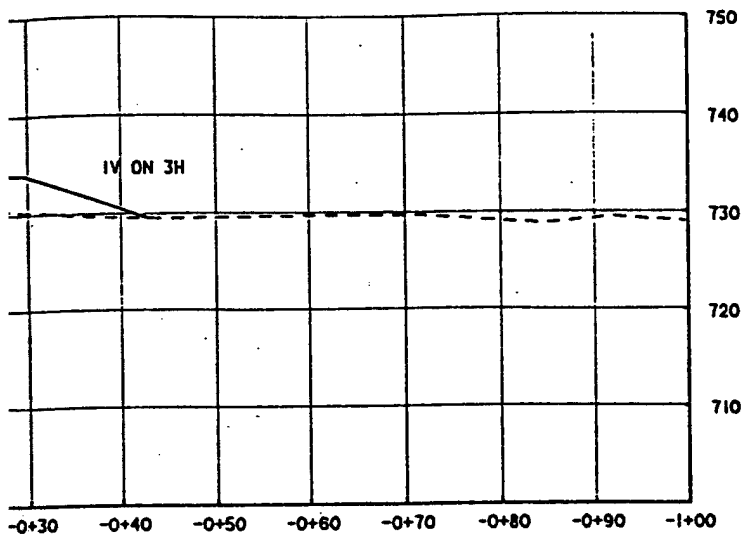
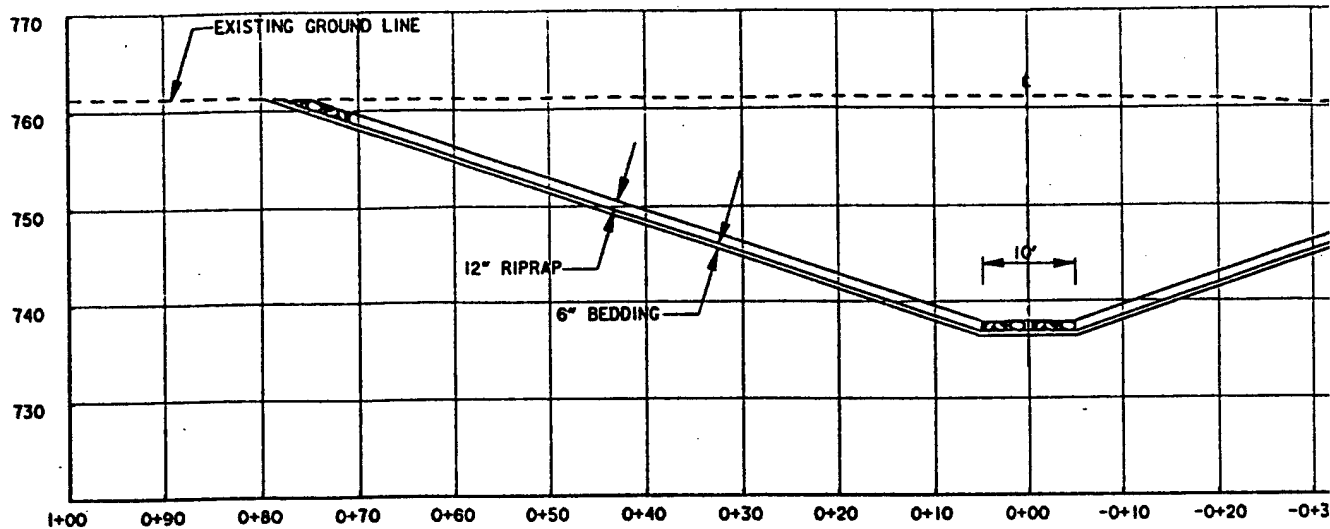


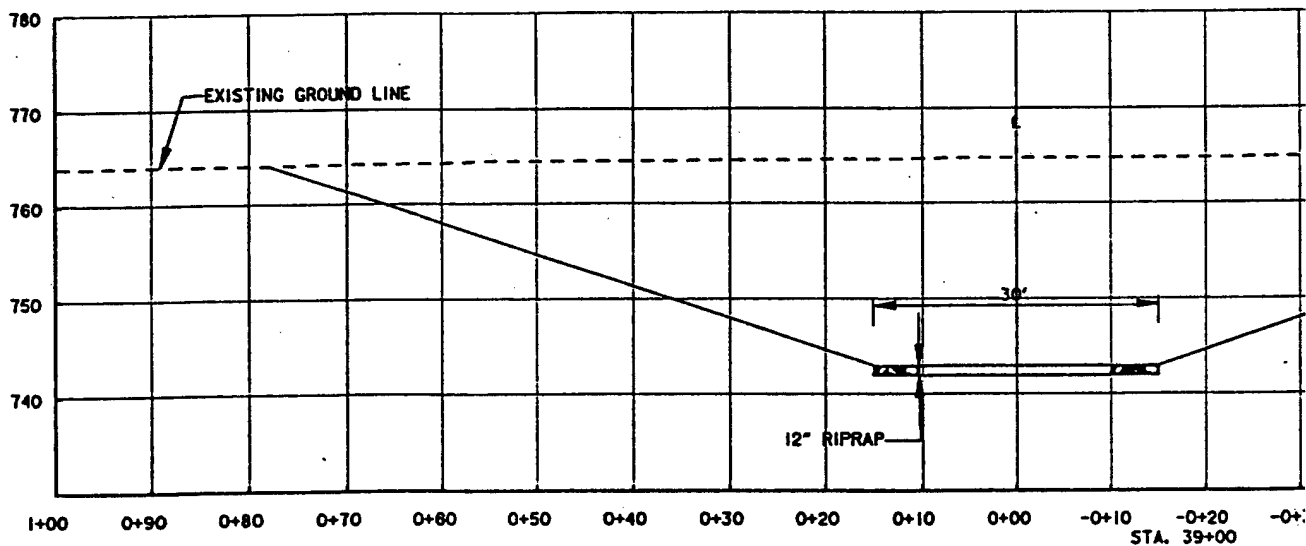
FIGURE 9

SYMBOL		DESCRIPTION		DATE	APPROVAL
DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA					
AE APPROVING OFFICIAL: _____					
DESIGNED: CHECKED: DRAWN: DESIGNED: CHECKED: DATE:	_____				

CAD FILE NAME: C33XSEC.DGN		DRAWING NUMBER: 10		SHT OF	
DATE:		SPEC NO:		_____	



G SECTION
99/999 STOUGHTON AVE BRIDGE
SCALE: AS SHOWN



H TYPICAL SECTION
99/999 STA. 31+60 TO 44+60

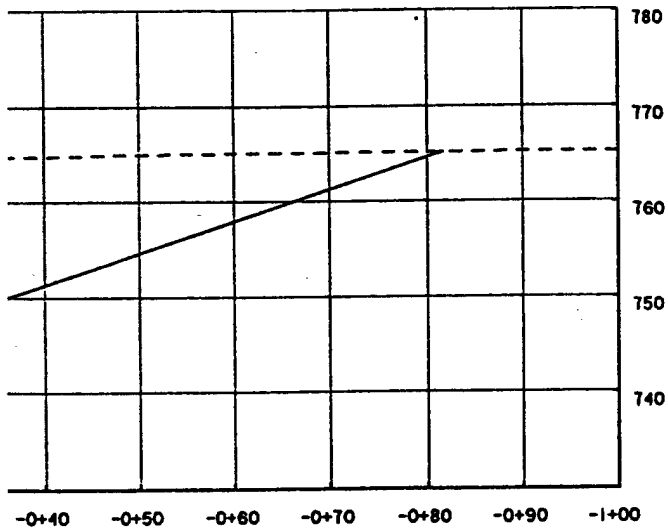
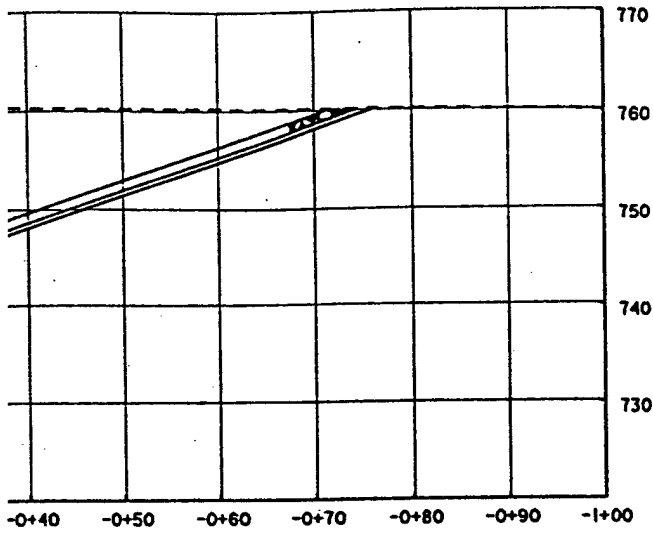
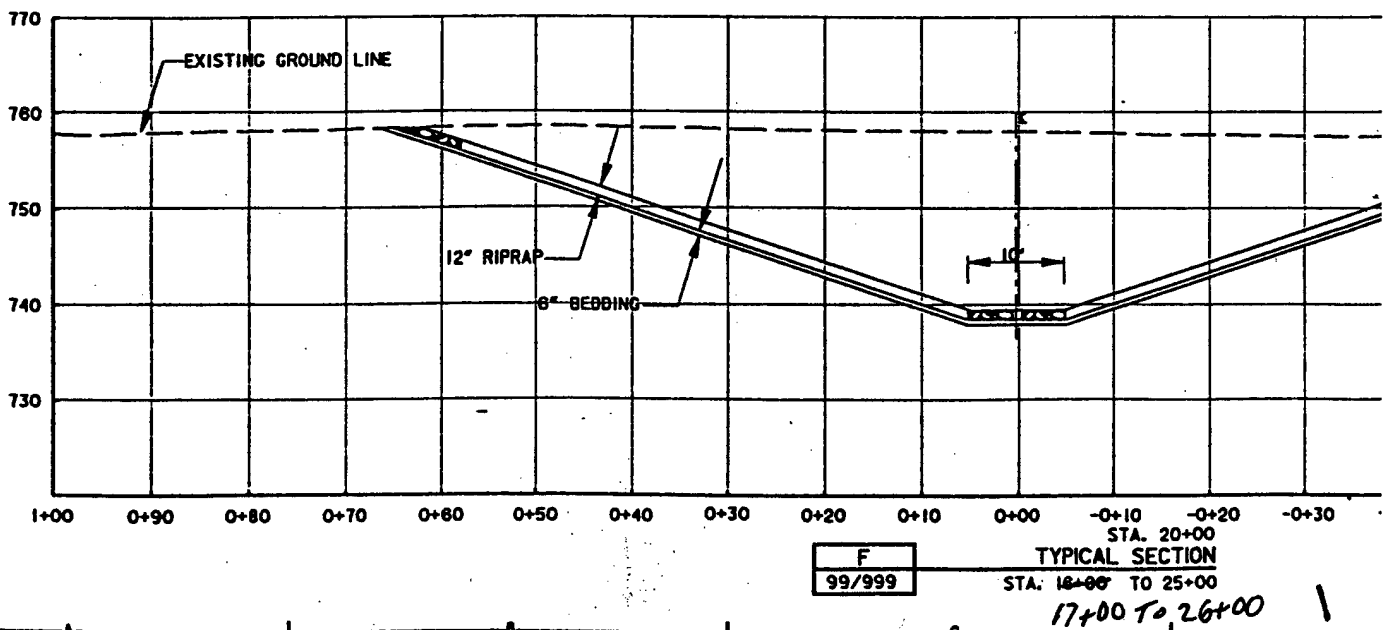
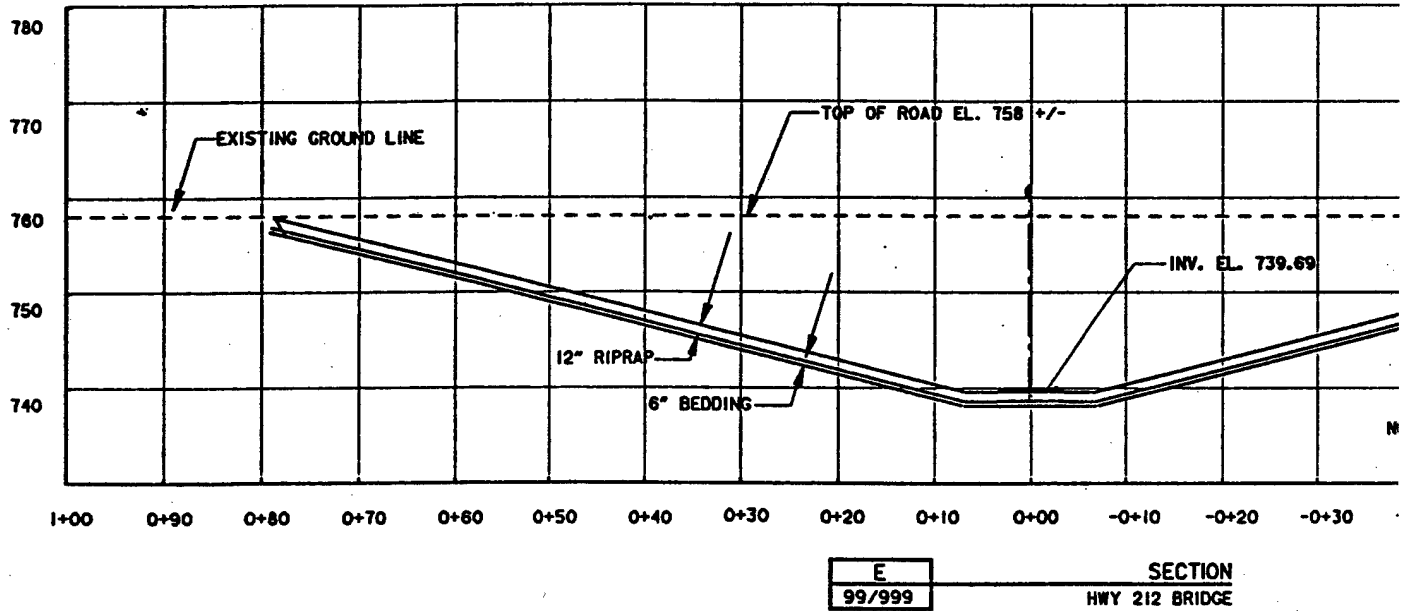
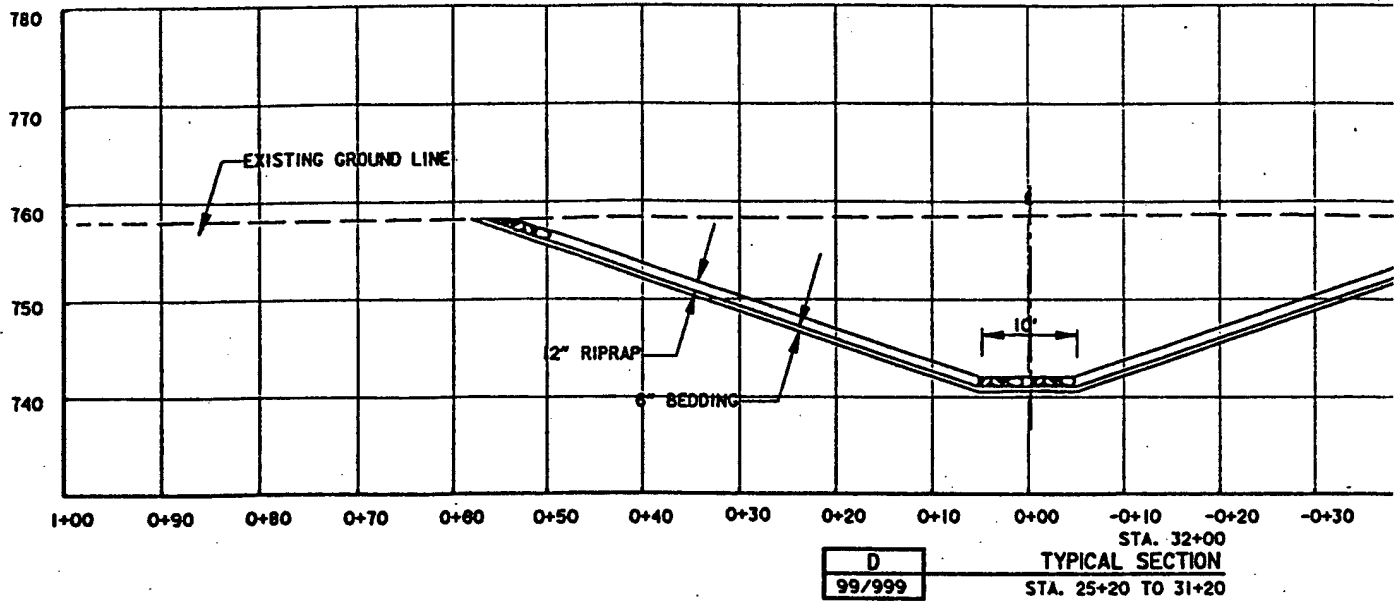
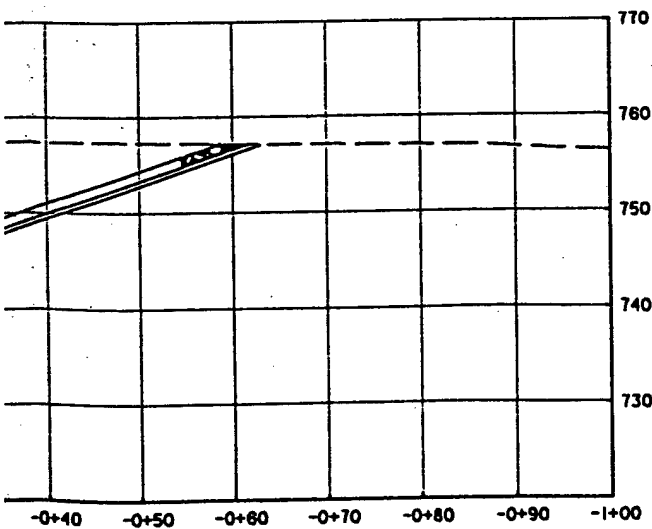
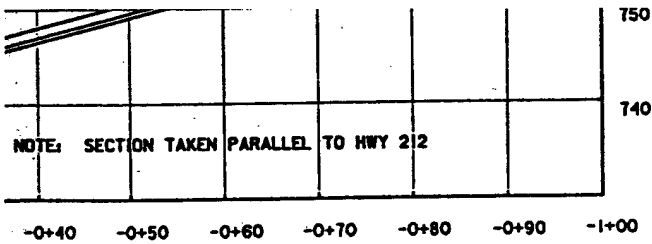


FIGURE 10

SYMBOL		DESCRIPTION		DATE	APPROVAL
		DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA			
AE APPROVING OFFICIAL:					
DESIGNED: CHECKED: DRAWN:					
DATE:	CAD FILE NAME: C33XSEC.DGN	DRAWING NUMBER:	SHT		
	SPEC NO.	11	OF		



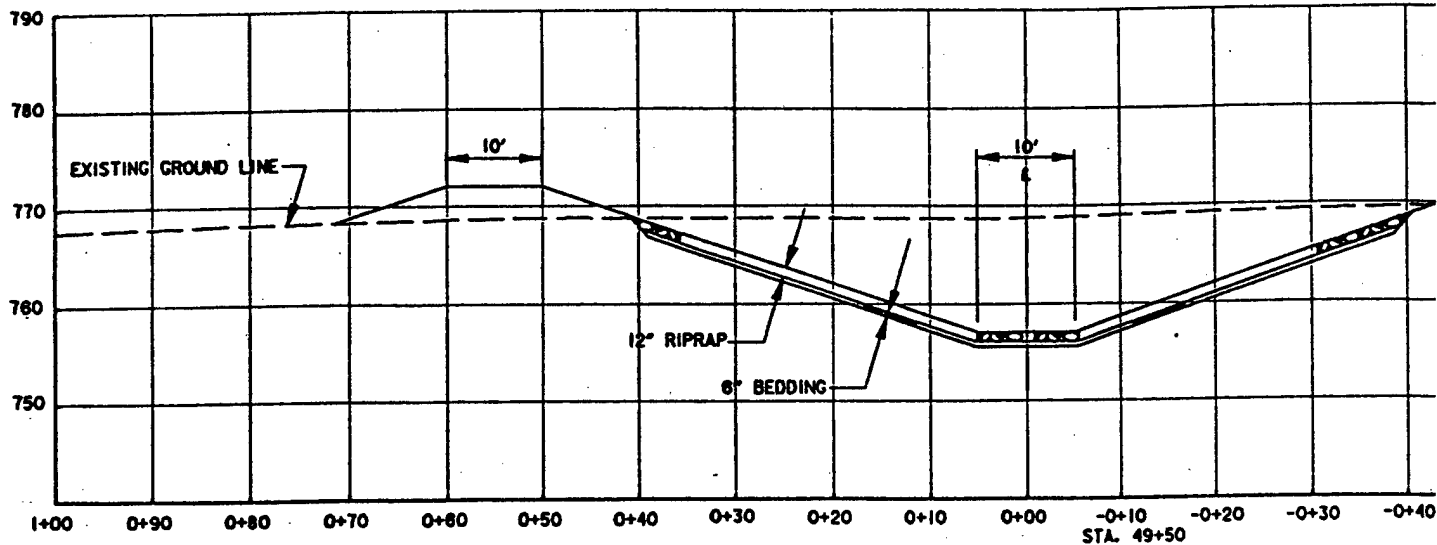


2

FIGURE 11

SYMBOL	DESCRIPTION	DATE	APPROVAL
DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA			
AE APPROVING OFFICIAL:		DRAWING NUMBER:	
DESIGNED:			
CHECKED:			
DRAWN:			
DATE:			
CAD FILE NAME: C32XSEC.DGN	SPEC NO:	SHT OF	

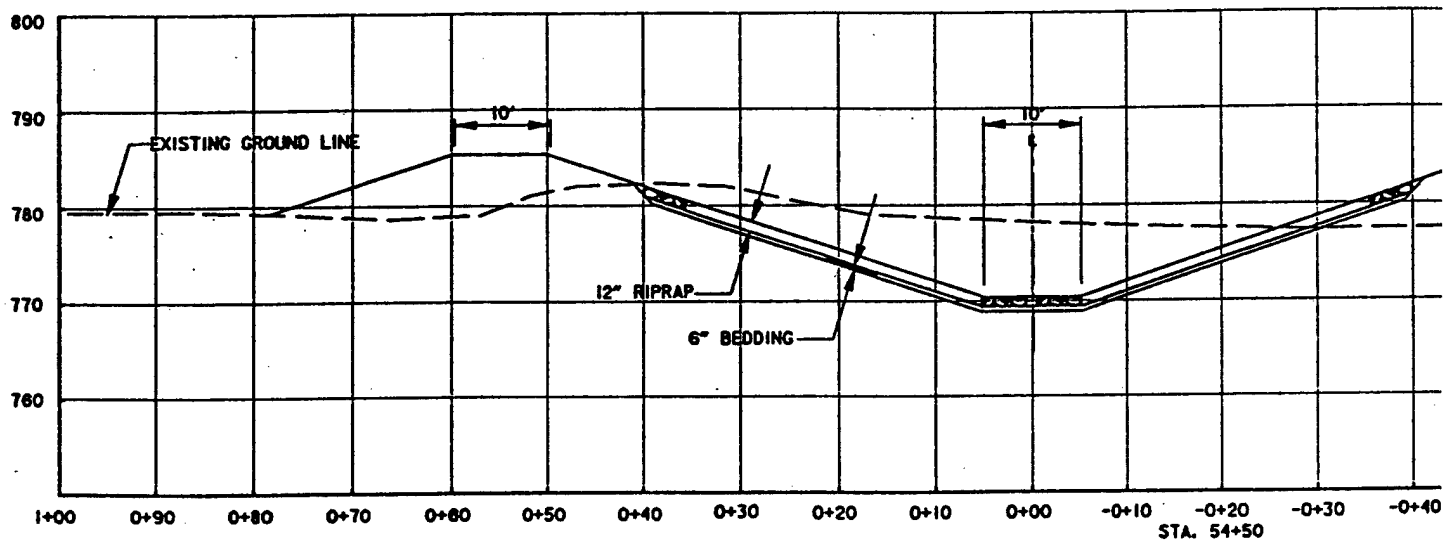
PIATER



A
99/999

TYPICAL SECTION
STA. 51+75 TO 47+05

52+50 to 47+50



B
99/999

TYPICAL SECTION
STA. 53+50 TO 57+00

STA. 54+00 TO 58+00

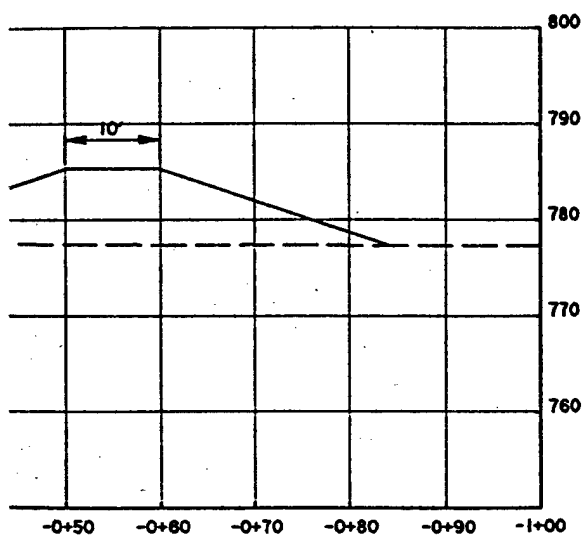
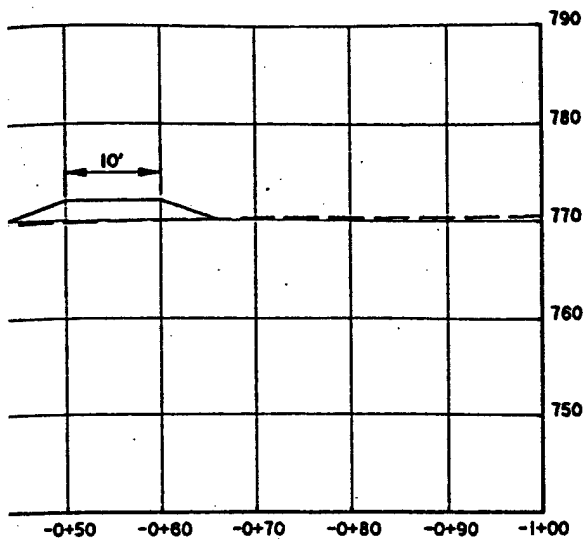
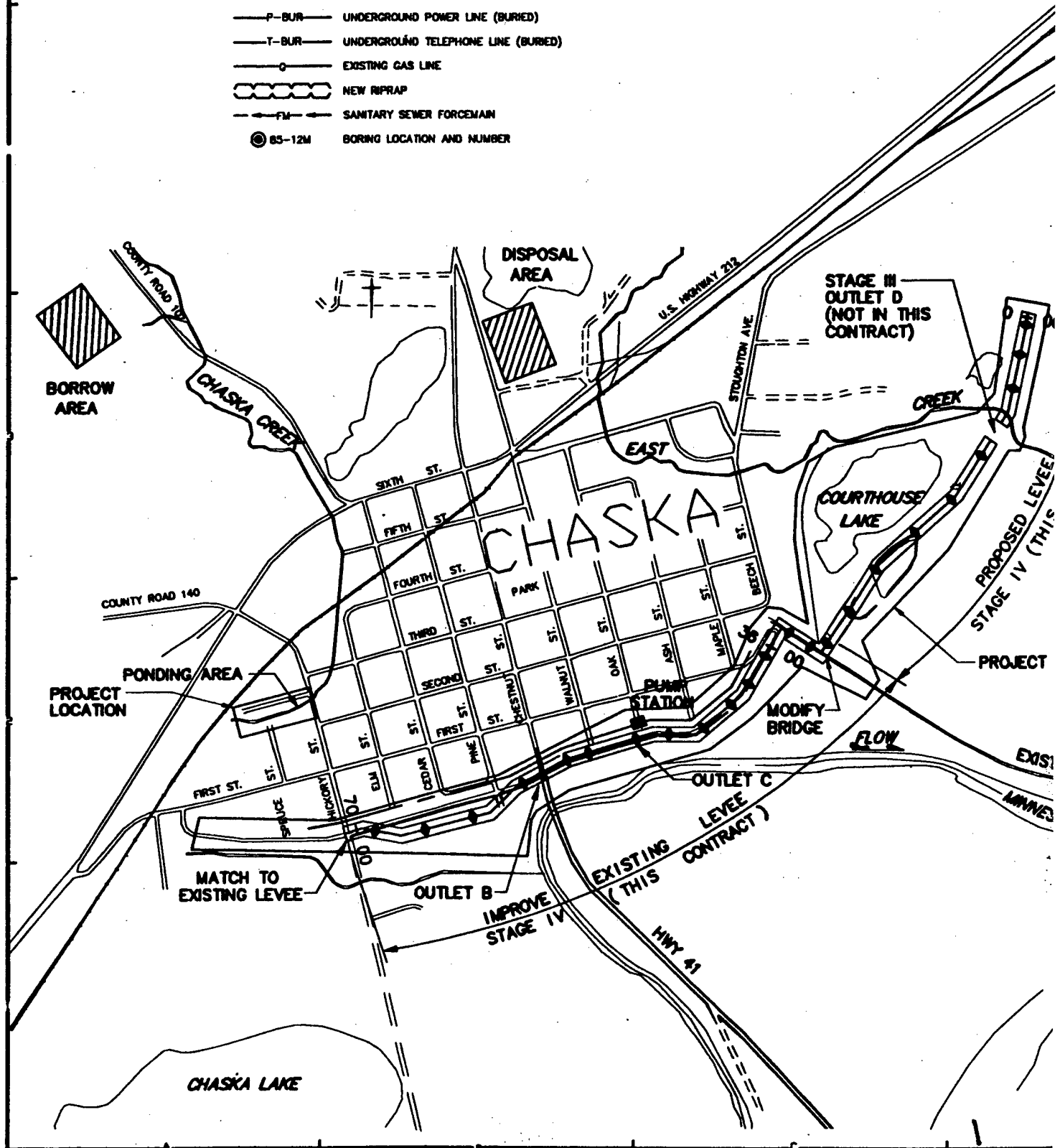


FIGURE 12

SYMBOL	DESCRIPTION	DATE	APPROVAL
<p>DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA</p>			
<p>AE APPROVING OFFICIAL:</p>			
<p>DESIGNED:</p> <p>CHECKED:</p> <p>DRAWN:</p>			
<p>DATE:</p>	<p>CAD FILE NAME: C31XSEC.DGN</p>	<p>DRAWING NUMBER:</p> <p>PLATE 13</p>	<p>SHT</p> <p>OF</p>

LEGEND

	LEVEE		DENOTES CUT
	EXISTING LEVEE		DENOTES FILL
	INTERCEPTOR PIPE		LIMITS OF WORK (TYP.)
	UNDERGROUND PETROLEUM PRODUCTS LINE		TYPICAL SECTION SECTION NUMBER DWG. NO. WHERE SECTION IS LOCATED
	UNDERGROUND STORM SEWER PIPE		10 SIDE DITCH INLET
	VALVE		EXISTING CULVERT
	EXISTING CONTOUR		SIDE DITCH
	EXISTING FENCE		
	POWER LINE & POWER POLE (OVERHEAD)		
	UNDERGROUND POWER LINE (BURIED)		
	UNDERGROUND TELEPHONE LINE (BURIED)		
	EXISTING GAS LINE		
	NEW RIPRAP		
	SANITARY SEWER FORCEMAIN		
	BORING LOCATION AND NUMBER		



VERTICAL CONTROL

STD. 3" BRASS DISC ON TOP OF S.E. WINGWALL OF
BRIDGE #0010, T.H. 41 OVER THE MINNESOTA RIVER.
ELEVATION 726.22

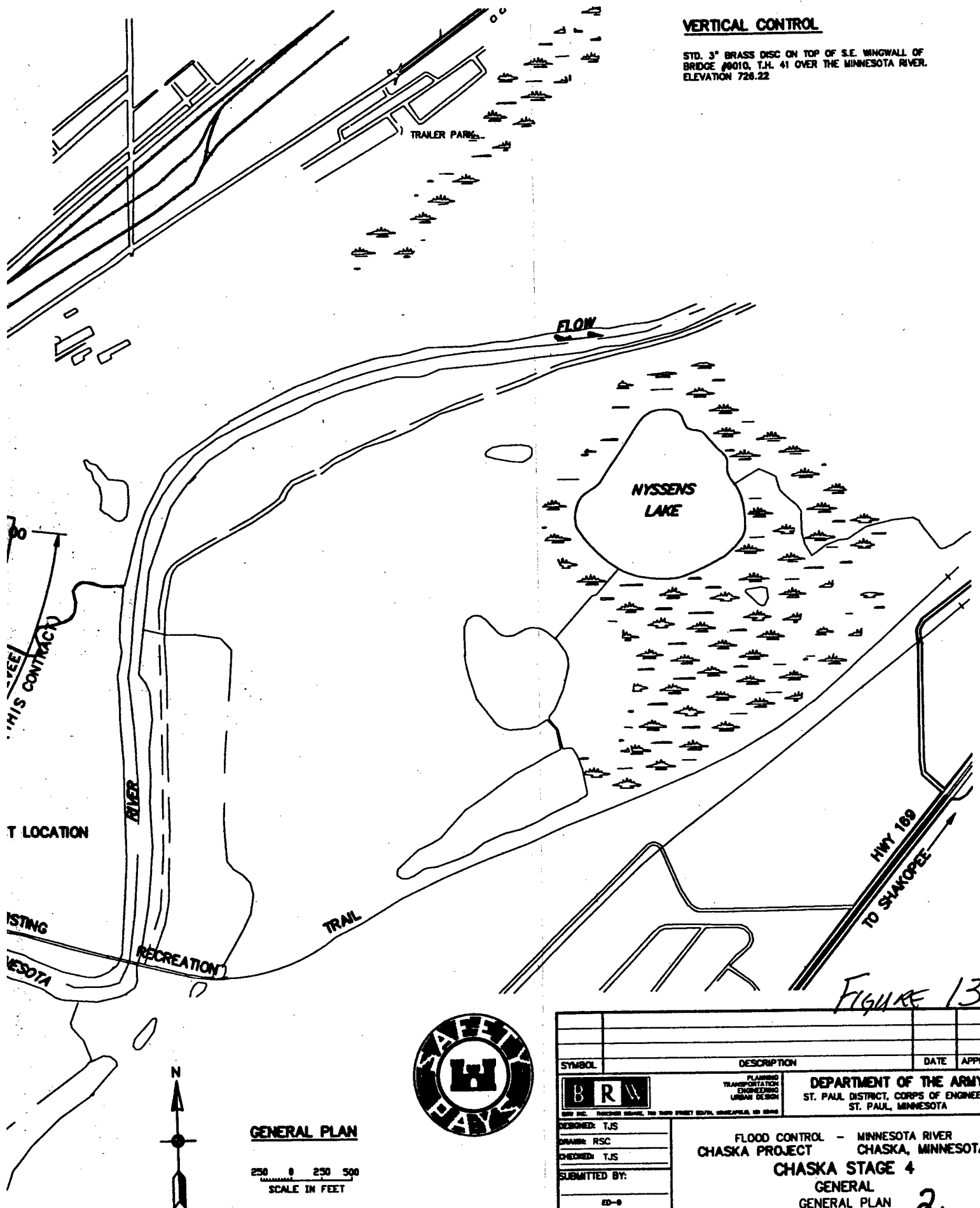


Figure 13.

SYMBOL	DESCRIPTION	DATE	APPROV.
BRW	PLANNED TRANSPORTATION ENGINEERING URBAN DESIGN		
DESIGNED: TJS		DEPARTMENT OF THE ARMY	
DRAWN: RSC		ST. PAUL DISTRICT, CORPS OF ENGINEERS	
CHECKED: TJS		ST. PAUL, MINNESOTA	
SUBMITTED BY:		FLOOD CONTROL - MINNESOTA RIVER	
ED-9		CHASKA PROJECT CHASKA, MINNESOTA	
ED-6H		CHASKA STAGE 4	
DATE: 07-29-92		GENERAL GENERAL PLAN	
SPEC NO:		2	
CAD FILE NAME: GEN-PLAN.DWG		DRAWING NUMBER:	
M34-CH-R-10/201		SHEET 2	
		OF 119	

VERTICAL CONTROL POINT

BM-#1 - EL. 708.20 TOP OF I.P.
R/W MON. P-180

NOTES:

- ELEVATIONS REFER TO M.S.L. (1929 ADJ.)
- COORDINATES AND GRID FOR PROJECT ARE LAMBERT GRID, MINNESOTA SOUTH ZONE.
- EXISTING TOPOGRAPHIC GROUND LINES MAY VARY FROM THOSE SHOWN ON PLANS.
- FILL EXISTING EAST CREEK TO EL. 705.0 UPON COMPLETION OF EAST CREEK REALIGNMENT.
- REMOVE & STOCKPILE TOPSOIL, PLACE 5" CL 5 AGGREGATE FOR HAUL ROAD NORTH OF LEVEE. RESTORE TO ORIGINAL CONDITION UPON COMPLETION OF PROJECT.
- SIDE DITCH SLOPES VARY TO 6% MAX.
- PLACE 5" CL 5 AGGREGATE MATERIAL ON TOP OF LEVEE AFTER TRUCKS ARE DONE HAULING.
- MATCH EXISTING FARM ACCESS AT STATIONS 0+00 AND 7+75E.
- CONTRACTOR TO PLACE 2 - 48" CMP CULVERTS IN EAST CREEK REALIGNMENT, FOR TEMPORARY HAUL ROAD USE, TO BE REMOVED UPON COMPLETION OF PROJECT.
- PLACE SILT FENCE ALONG BOTH BANKS OF EAST CREEK REALIGNMENT, AS DIRECTED BY THE ENGINEER.
- TEMPORARY OPENING WILL BE COMPLETED AS OUTLET D, STAGE III DOCUMENTS.

REFERENCES:

DWG NO.

- | | |
|--------------------------------------|------------|
| 1. GENERAL PLAN | 10/201 |
| 2. LEVEE ALIGNMENT | 84/218 |
| 3. AGGREGATE TRAIL TYPICAL | 84/238 |
| 4. TEMPORARY EROSION CONTROL DETAILS | 84/237 |
| 5. EAST CREEK ALIGNMENT | 84/219 |
| 6. GUARDPOST BARRIER DETAIL | 84/307 |
| 7. FARM ACCESS ALIGNMENT | 84/218 |
| 8. MISCELLANEOUS CROSS-SECTIONS | 84/313-315 |
| 9. FARM ACCESS PROFILE & SECTION | 84/243 |
| 10. EAST CREEK PROFILE & SECTION | 84/244 |

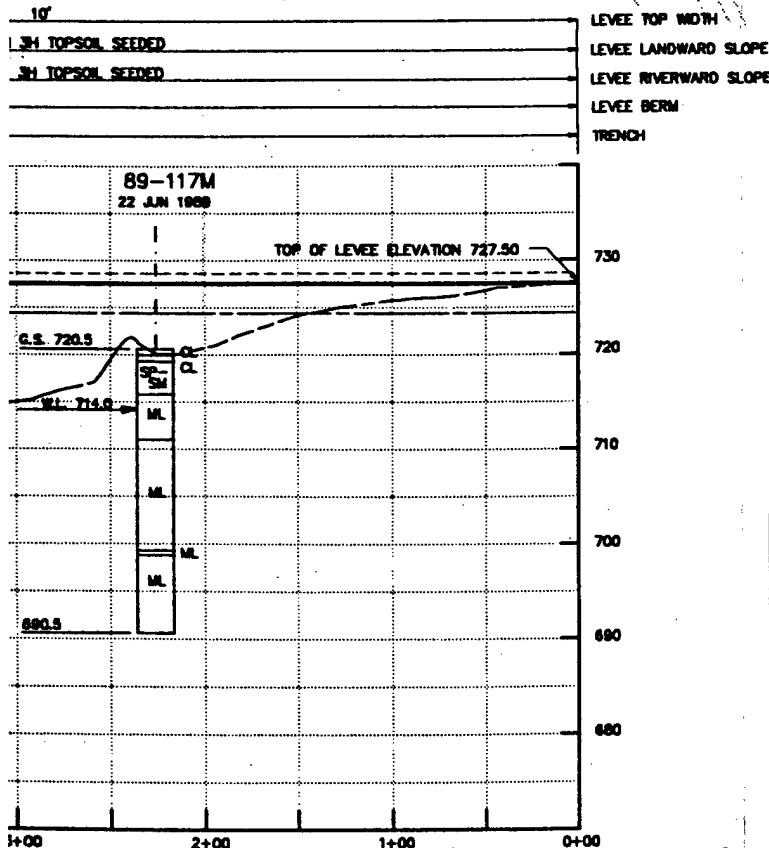
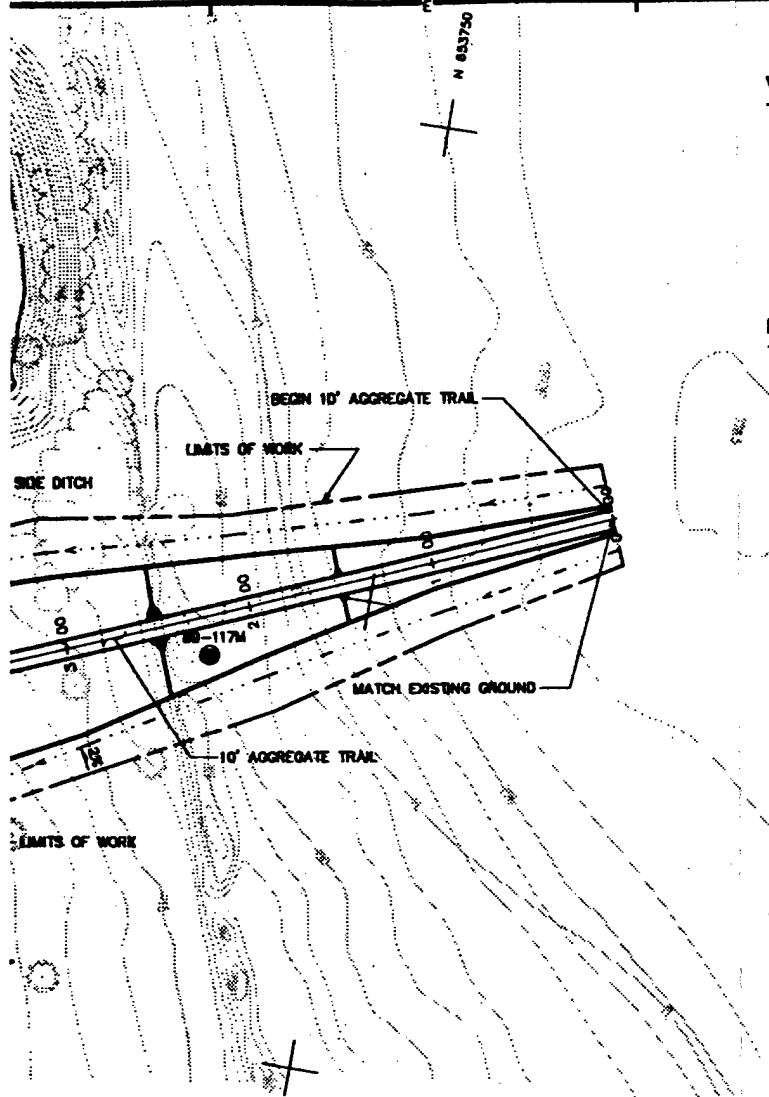
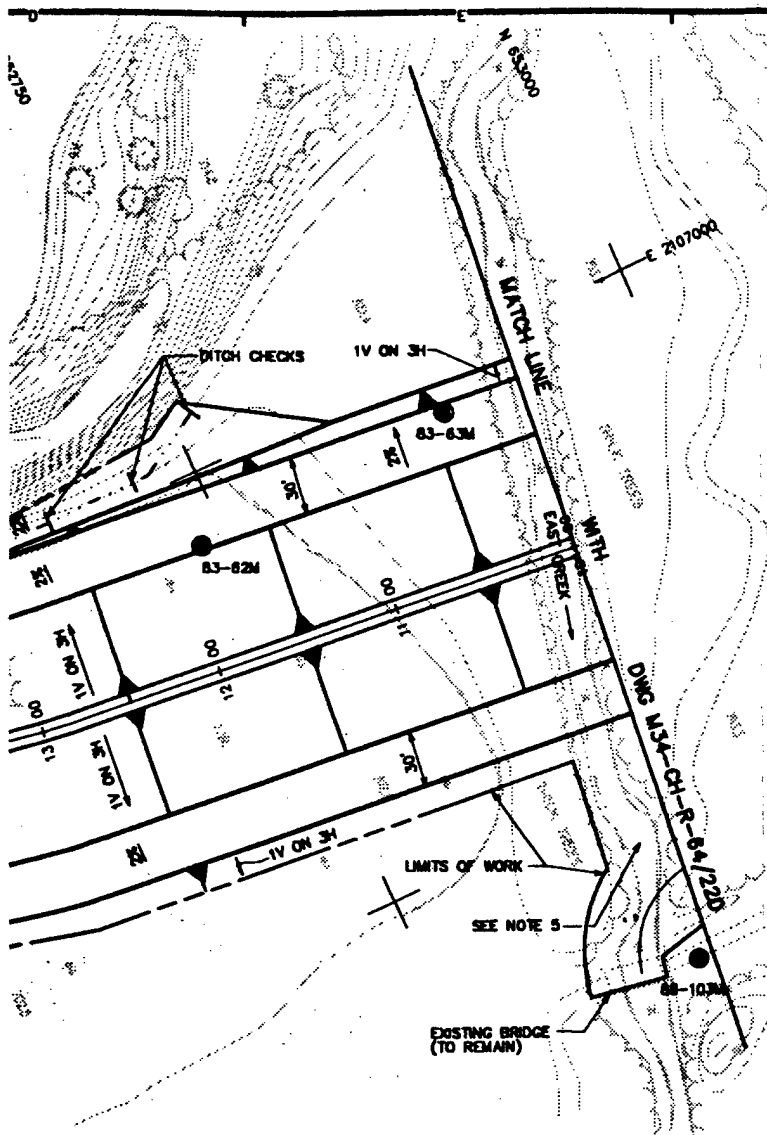


Figure 14

SYMBOL	DESCRIPTION	DATE	APPROVAL
<div style="display: flex; justify-content: space-between;"> <div> <p>BRW</p> <p>DESIGNED: TJS</p> <p>DRAWN: RSC</p> <p>CHECKED: TJS</p> <p>SUBMITTED BY:</p> <p>ED-0</p> <p>ED-0H</p> <p>DATE: 07-29-92</p> </div> <div> <p>PLANNING TRANSPORTATION ENGINEERING URBAN DESIGN</p> <p>DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA</p> <p>FLOOD CONTROL - MINNESOTA RIVER CHASKA PROJECT CHASKA, MINNESOTA CHASKA STAGE 4 DRAINAGE & LEVEES PLAN & PROFILE STA. 0+00 TO STA. 10+00</p> <p>CAD FILE NAME: MN10P001.DWG DRAWING NUMBER: M34-CH-R-84/220</p> </div> <div> <p>SHEET 21 OF 119</p> </div> </div>			



VERTICAL CONTROL POINT

BM-#2 - EL. 716.89 TOP OF I.P.
R/W MON. P-160

NOTES:

- ELEVATIONS REFER TO M.S.L. (1928 ADJ.)
- COORDINATES AND GRID FOR PROJECT ARE LAMBERT GRID, MINNESOTA SOUTH ZONE.
- EXISTING TOPOGRAPHIC GROUND LINES MAY VARY FROM THOSE SHOWN ON PLANS.
- SIDE DITCH SLOPES VARY TO 8% MAX.
- FILL EXISTING EAST CREEK TO EL. 705.0 UPON COMPLETION OF EAST CREEK REALIGNMENT.
- PLACE 5" CLS AGGREGATE MATERIAL ON TOP OF LEVEE AFTER TRUCKS ARE DONE HAULING.
- PLACE SILT FENCE ALONG BOTH BANKS OF EAST CREEK REALIGNMENT, AS DIRECTED BY THE ENGINEER.
- PLACE SILT FENCE ALONG RIVERWARD SIDE OF LEVEE.

REFERENCES:

DWG NO.

- | | |
|---------------------------------------|--------|
| 1. GENERAL PLAN | 10/201 |
| 2. LEVEE ALIGNMENT | 64/218 |
| 3. AGGREGATE TRAIL TYPICAL | 64/238 |
| 4. TEMPORARY EROSION CONTROL DETAILS | 64/237 |
| 5. EAST CREEK ALIGNMENT | 64/218 |
| 6. EAST CREEK PROFILE & SECTION | 64/244 |
| 7. COURTHOUSE LAKE RECREATIONAL TRAIL | 64/305 |

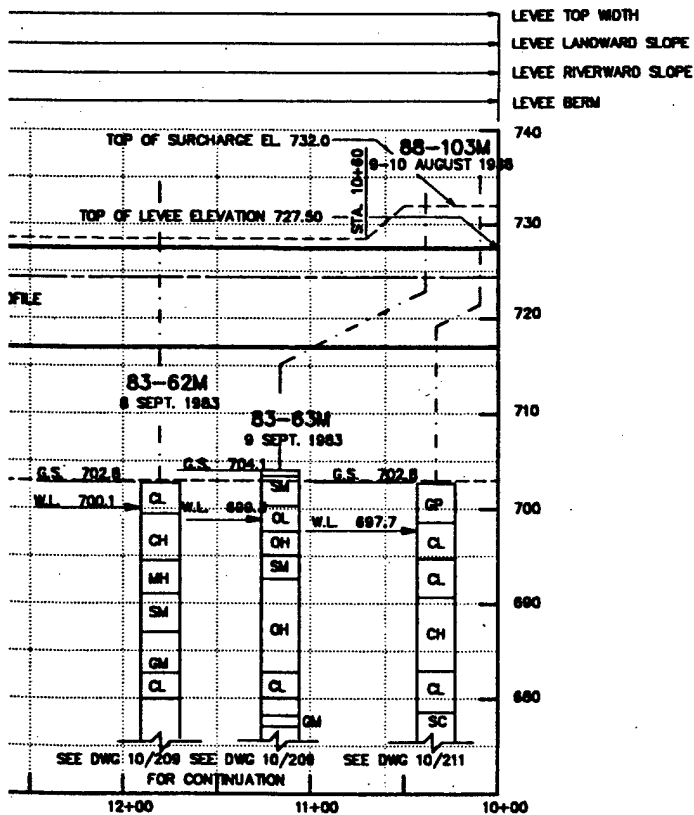

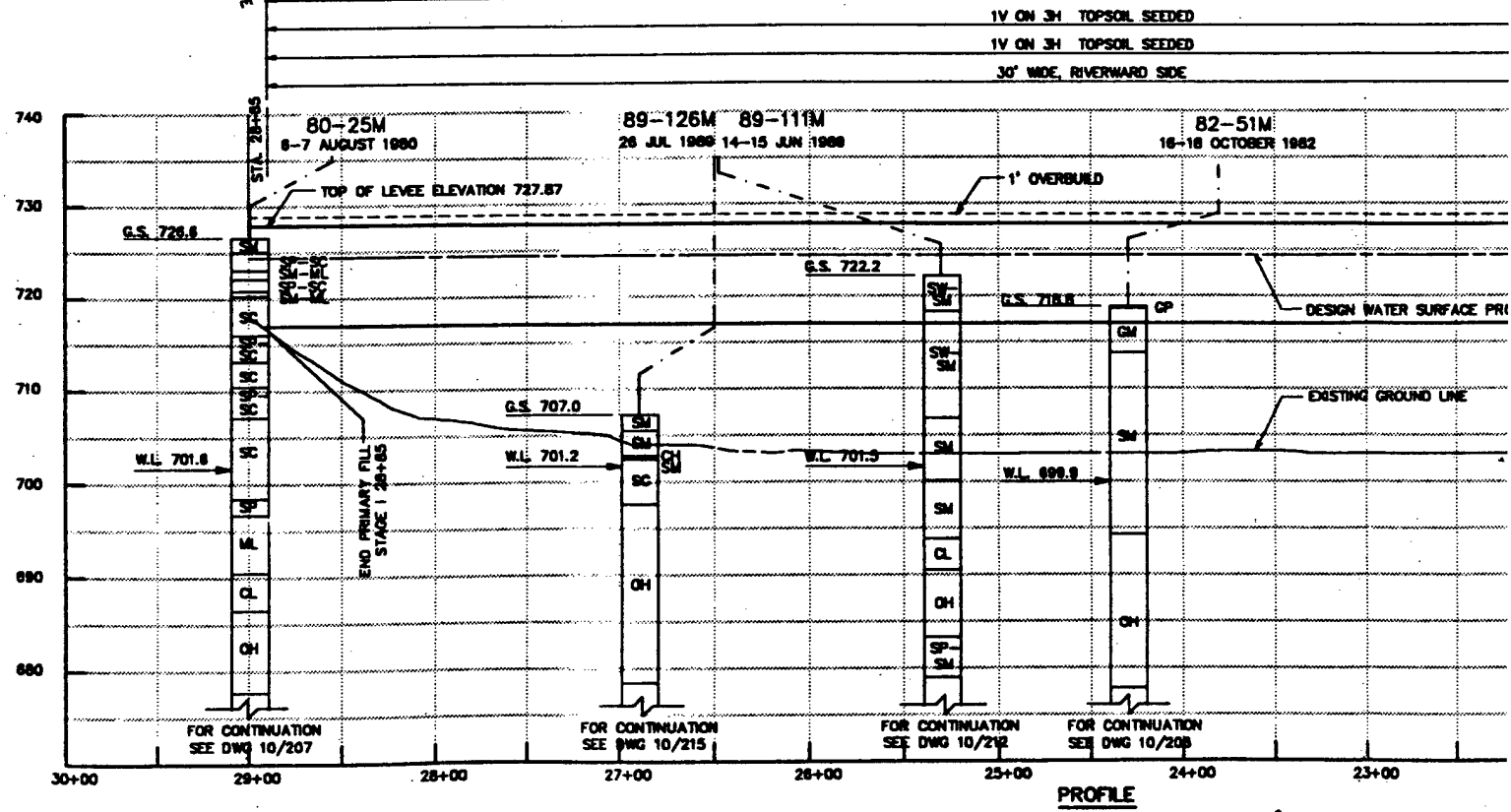
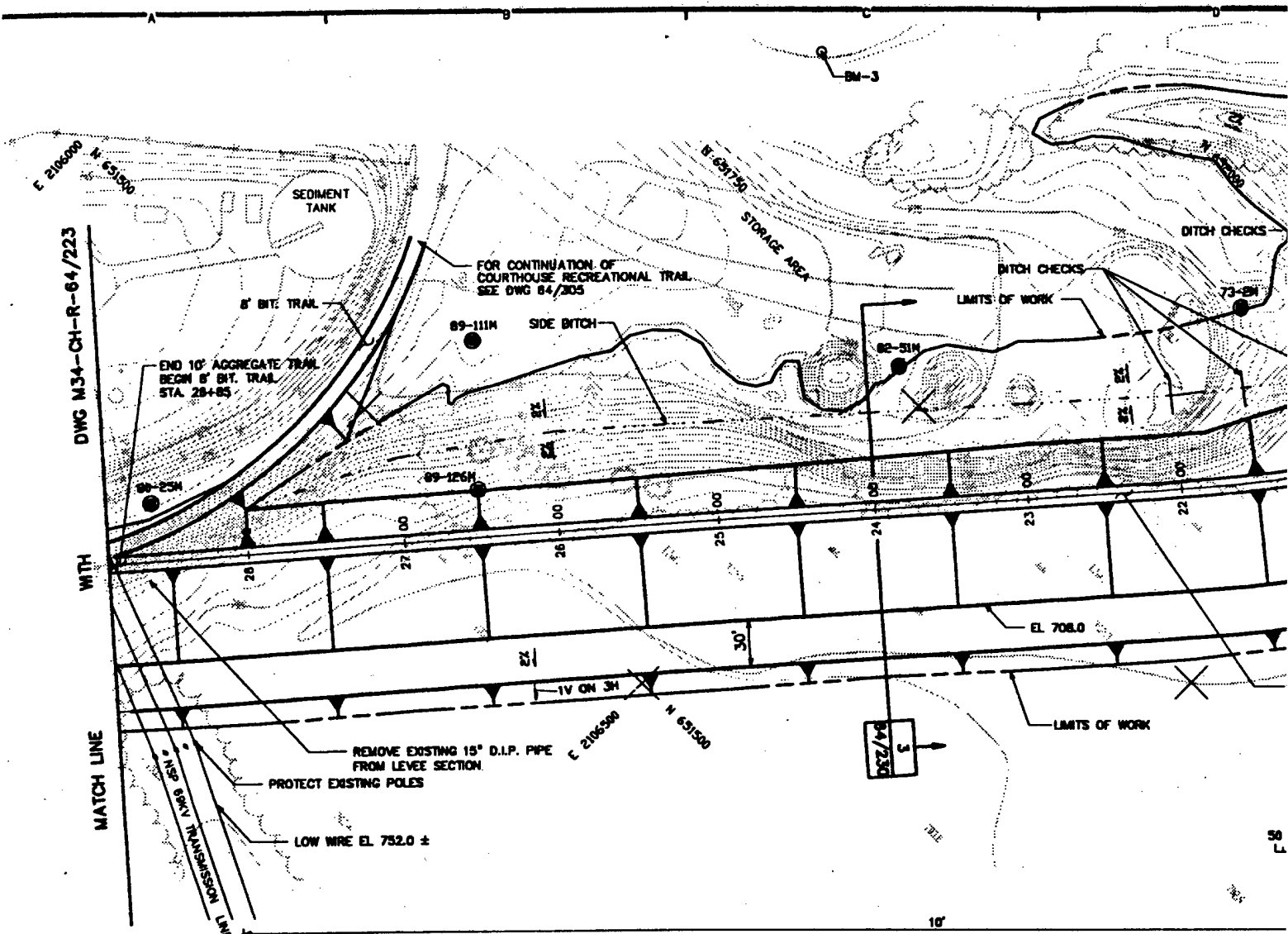
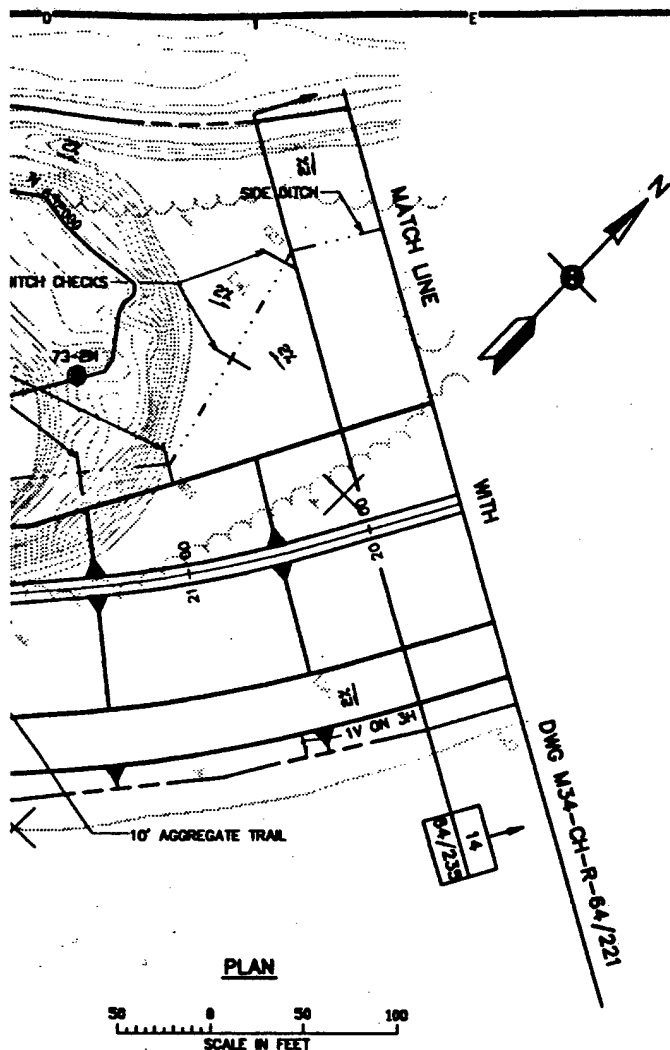


FIGURE 15

SYMBOL		DESCRIPTION		DATE	APPROVAL
		PLANNING TRANSPORTATION ENGINEERING URBAN DESIGN		DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA	
DESIGNED: TJS		FLOOD CONTROL - MINNESOTA RIVER CHASKA PROJECT CHASKA, MINNESOTA CHASKA STAGE 4 DRAINAGE & LEVEES PLAN & PROFILE STA. 10+00 TO STA. 19+50			
DRAWING: RSC					
CHECKED: TJS					
SUBMITTED BY:					
ED-0		CAD FILE NAME: MN10P002.DWG		DRAWING NUMBER:	SHT 22
DATE: 07-29-92		SPEC NO:		M34-CH-R-64/221	OF 119



PROFILE



VERTICAL CONTROL POINT

BM-#3 - EL. 714.18 TOP OF I.P.
R/W MON. T-217

NOTES:

- ELEVATIONS REFER TO M.S.L. (1929 ADJ.)
- COORDINATES AND GRID FOR PROJECT ARE LAMBERT GRID, MINNESOTA SOUTH ZONE.
- EXISTING TOPOGRAPHIC GROUND LINES MAY VARY FROM THOSE SHOWN ON PLANS.
- SIDE DITCH SLOPES VARY TO 6% MAX
- PLACE 5" CLS AGGREGATE MATERIAL ON TOP OF LEVEE AFTER TRUCKS ARE DONE HAULING.
- PLACE SILT FENCE ALONG RIVERWARD SIDE OF LEVEE.

REFERENCES:

DWG NO.

- | | |
|---------------------------------------|--------|
| 1. GENERAL PLAN | 10/201 |
| 2. LEVEE ALIGNMENT | 64/218 |
| 3. AGGREGATE TRAIL TYPICAL | 64/236 |
| 4. BITUMINOUS TRAIL TYPICAL | 64/236 |
| 5. TEMPORARY EROSION CONTROL DETAILS | 64/237 |
| 6. COURTHOUSE LAKE RECREATIONAL TRAIL | 64/305 |

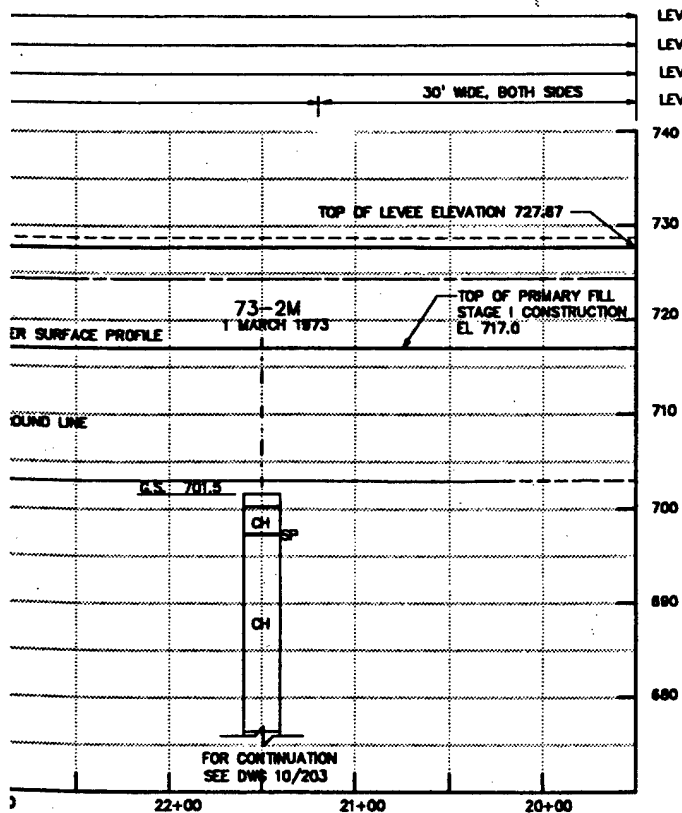
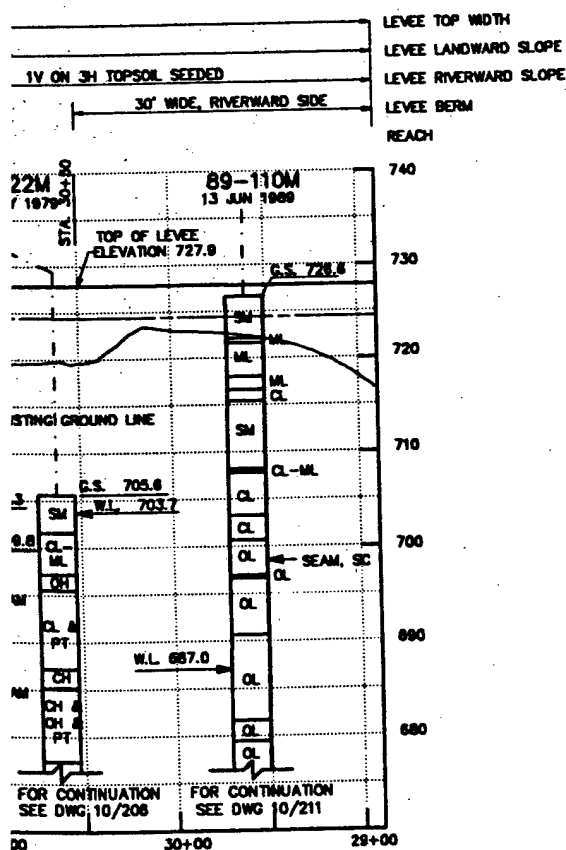
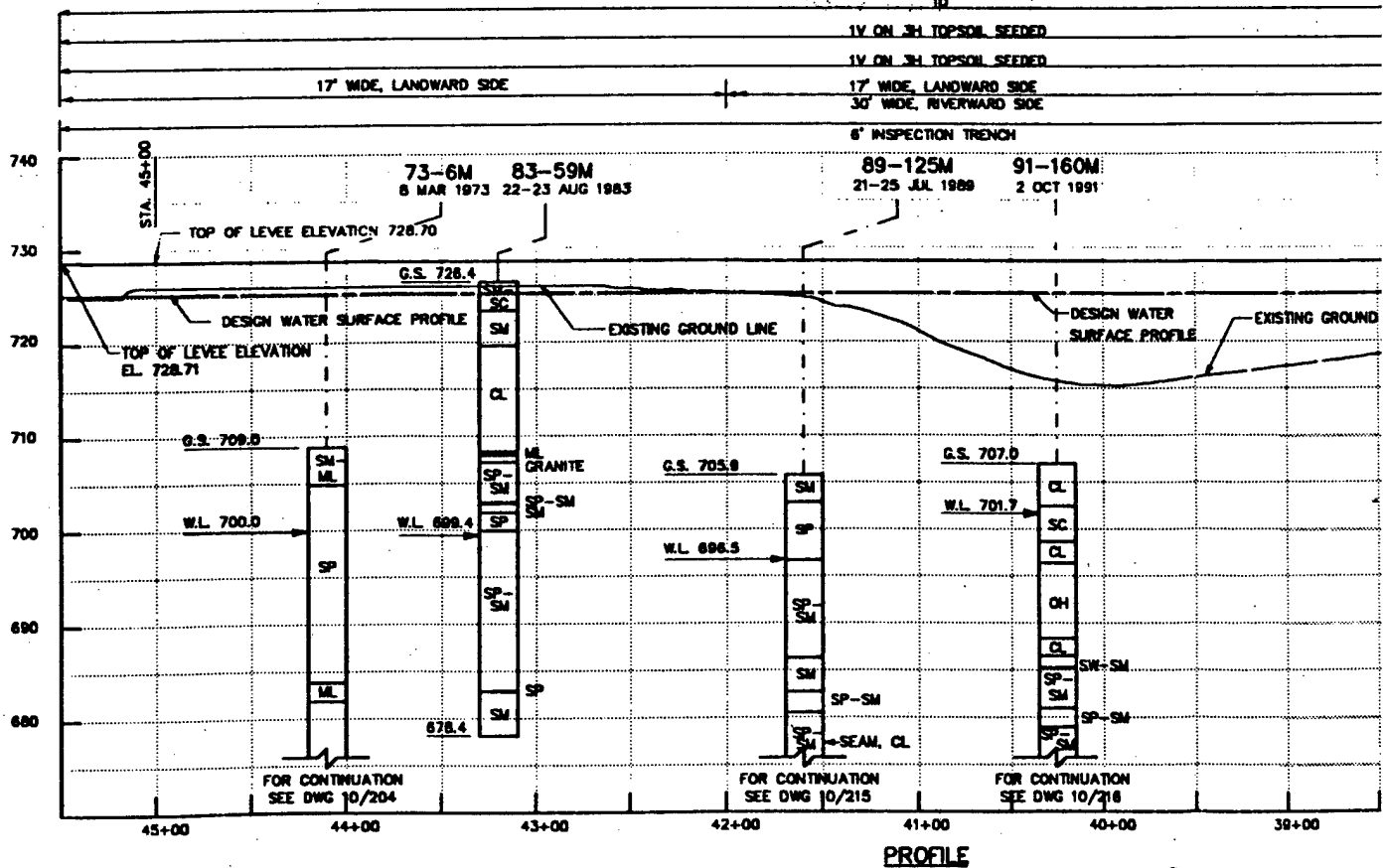
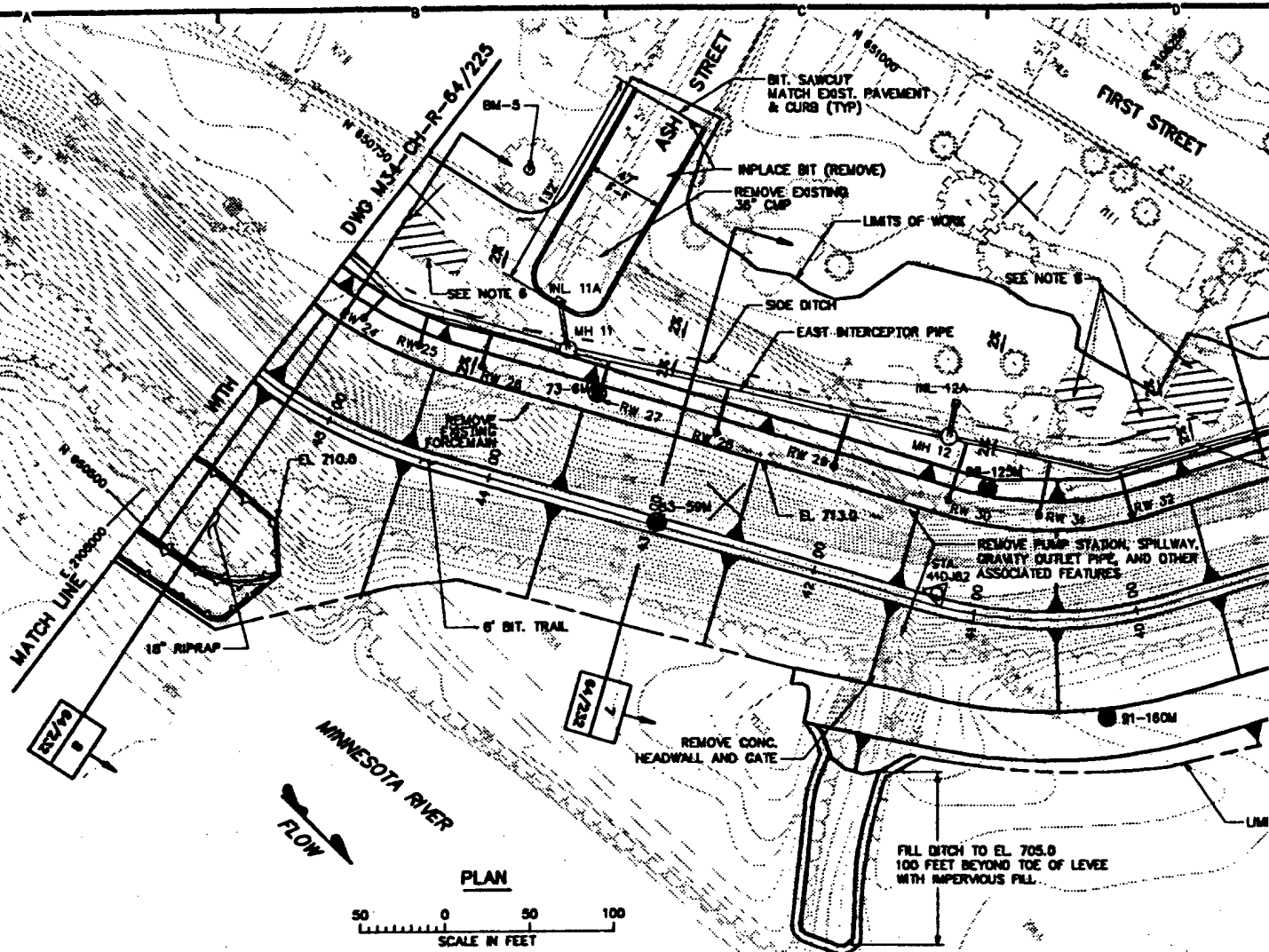


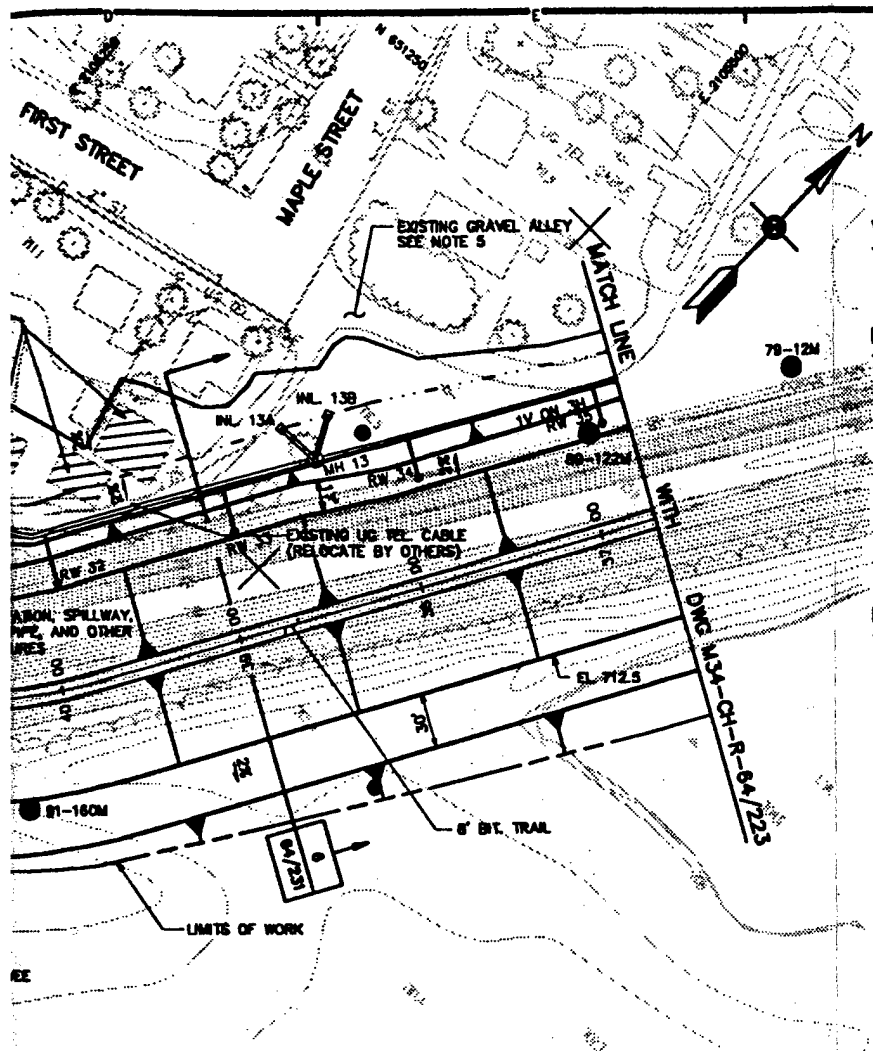
Figure 16

SYMBOL	DESCRIPTION	DATE	APPROVAL
BRW	PLANNING TRANSPORTATION ENGINEERING URBAN DESIGN		
DESIGNED: TJS DRAWN: RSC CHECKED: TJS SUBMITTED BY: ED-8 ED-8H			
DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA			
FLOOD CONTROL - MINNESOTA RIVER CHASKA PROJECT CHASKA, MINNESOTA CHASKA STAGE 4 DRAINAGE & LEVEES PLAN & PROFILE STA. 19+50 TO STA. 28+90			
CAD FILE NAME: MN10P003.DWG DATE: 07-29-92		DRAWING NUMBER: M34-CH-R-64/222 SHEET 23 OF 119	

2

[illegible]





VERTICAL CONTROL POINT

BM-JS - EL. 710.83 2 NAILS IN SO
FACE OF ASH SO END ASH ST.
± 38' SE OF SE CORNER OF GARAGE

HORIZONTAL CONTROL POINT

STA. 410+82
X=2,105,376.527
Y=650,800.401

NOTES:

1. ELEVATIONS REFER TO M.S.L. (1929 ADJ.)
2. COORDINATES AND GRID FOR PROJECT ARE LAMBERT GRID, MINNESOTA SOUTH ZONE.
3. EXISTING TOPOGRAPHIC GROUND LINES MAY VARY FROM THOSE SHOWN ON PLANS.
4. SIDE DITCH SLOPES VARY TO 6% MAX.
5. REPLACE 10' GRAVEL ALLEY WHERE DISTURBED STA. 37+00.
6. BUILDINGS TO BE REMOVED BY OTHERS, CONTRACTOR SHALL REMOVE SLAB OR FOUNDATION AND BACKFILL WITH GRANULAR MATERIAL.
7. CONSTRUCT SIDE DITCH ALONG LANDWARD OF LEVEE BERM TO DIRECT RUNOFF INTO INTERCEPTOR PIPE INLETS.
8. EXISTING DISTRIBUTION POWER LINES, POLES, AND GUY WIRES TO BE RELOCATED BY CITY FORCES.
9. ALL WATER MAIN, SANITARY SEWER AND FORCE MAINS BENEATH PROPOSED LEVEE SHALL BE REMOVED.
10. PLACE SILT FENCE ALONG RIVERWARD SIDE OF LEVEE.
11. PROPOSED CURB & GUTTER IN ASH TO HAVE OUTFALL GUTTER TO INLET 11A. FIELD VERIFY TOP OF CURB ELEVATIONS AND PROVIDE CURB CUTS TO ALLOW SIDE DITCH TO DRAIN INTO INLETS.

REFERENCES:

DWG NO.

- | | |
|--------------------------------------|--------|
| 1. GENERAL PLAN | 10/201 |
| 2. LEVEE ALIGNMENT | 64/218 |
| 3. EAST INTERCEPTOR PIPE | 64/253 |
| 4. INLET SCHEDULE | 64/252 |
| 5. RELIEF WELL | 64/254 |
| 6. TEMPORARY EROSION CONTROL DETAILS | 64/237 |

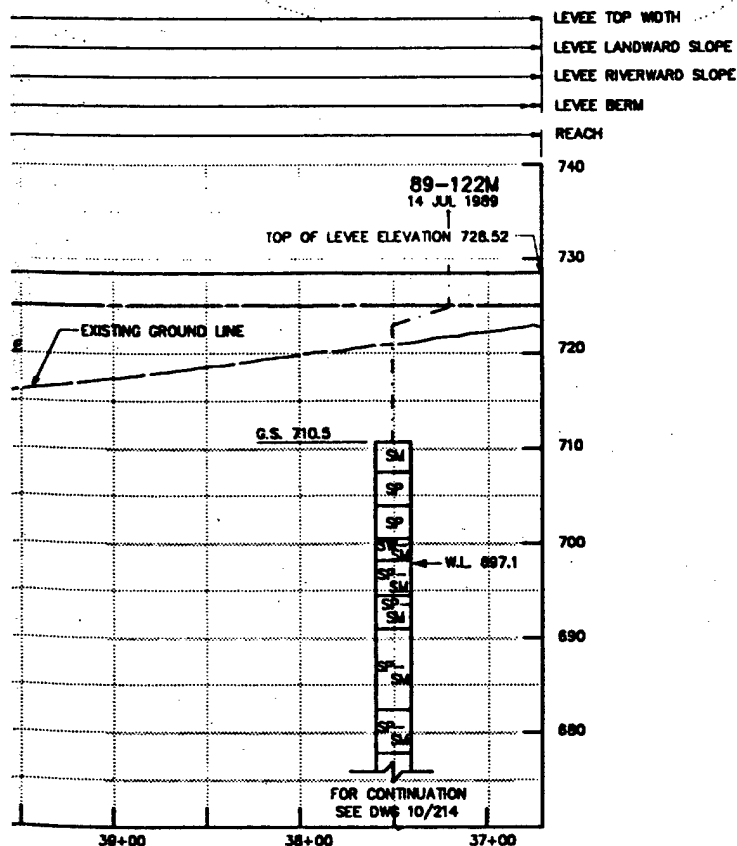
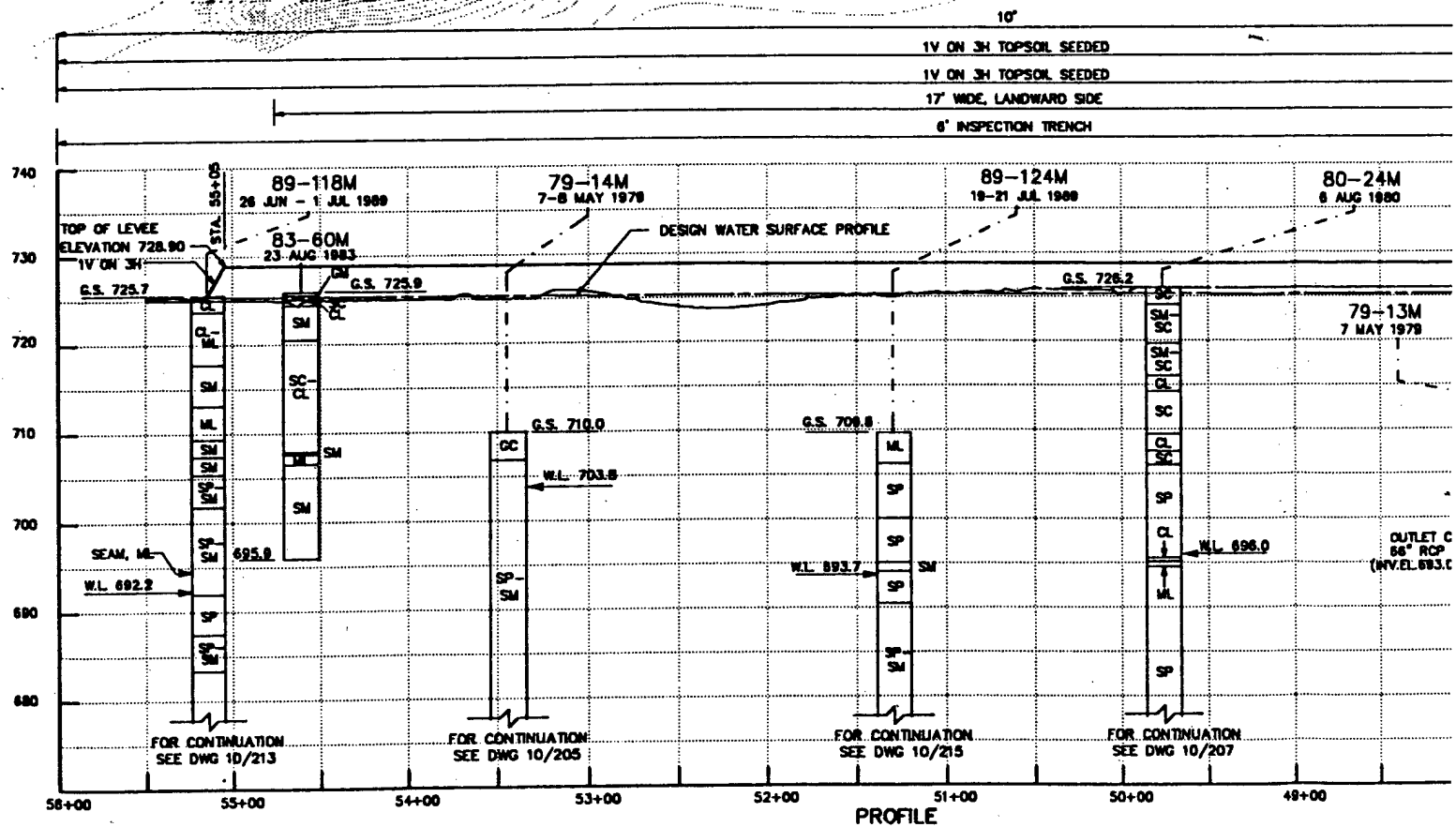
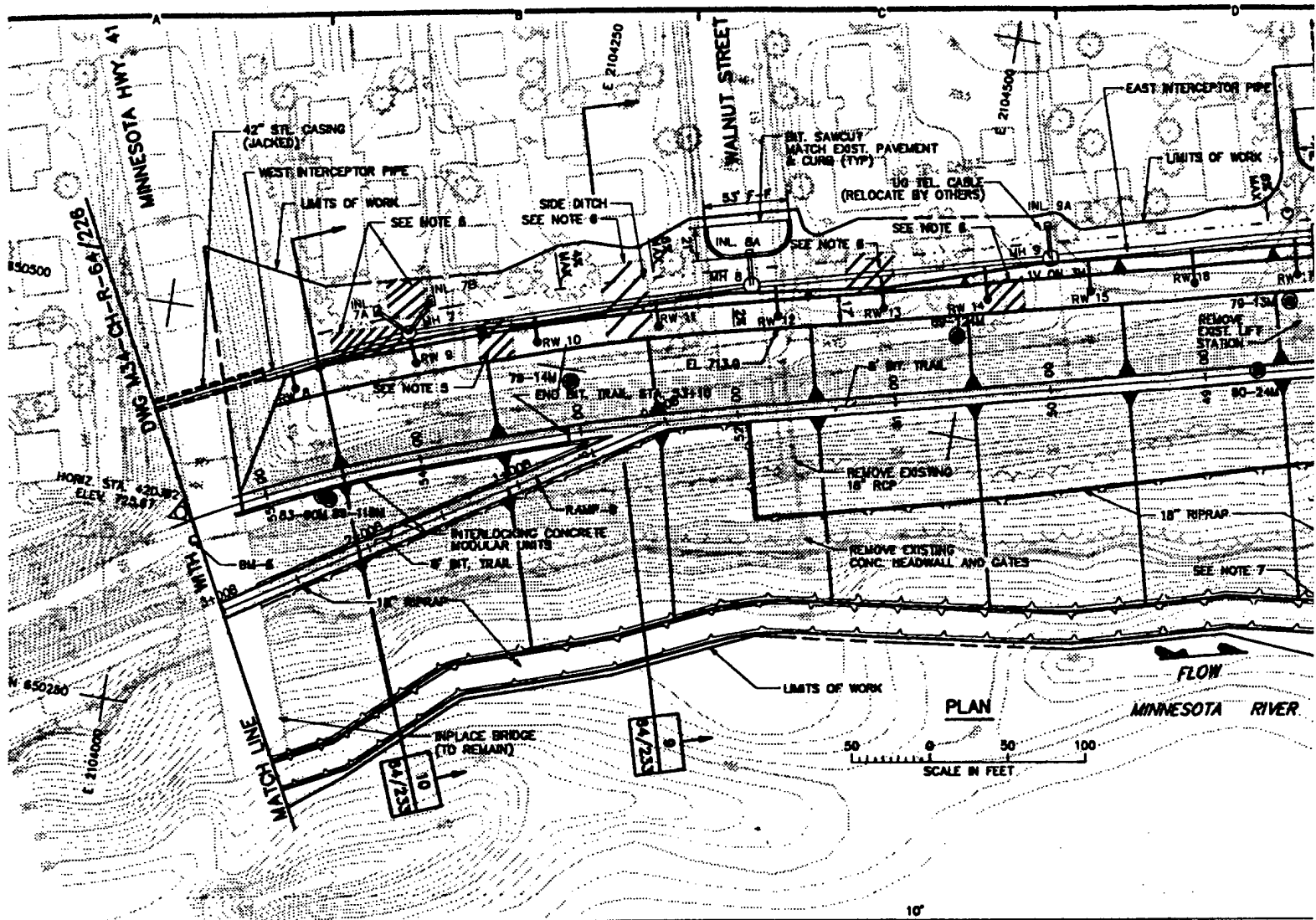
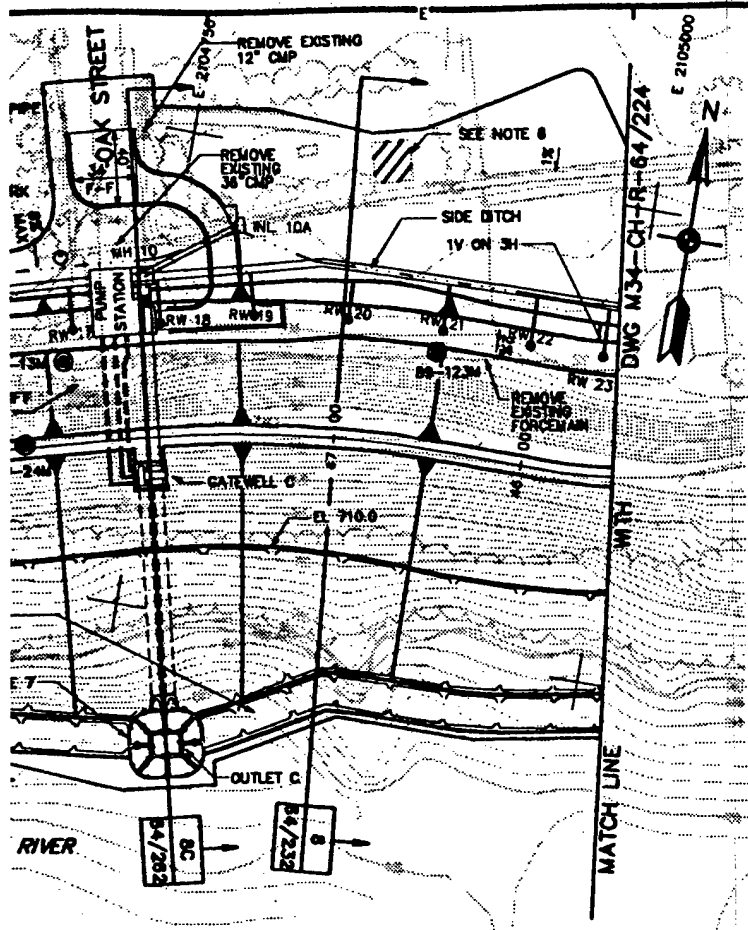


FIGURE 18

SYMBOL		DESCRIPTION		DATE	APPROV.
		PLANNING TRANSPORTATION ENGINEERING URBAN DESIGN		DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA	
DESIGNED: TJS DRAWN: RSC CHECKED: TJS SUBMITTED BY: ED-8 ED-8H		FLOOD CONTROL - MINNESOTA RIVER CHASKA PROJECT CHASKA, MINNESOTA CHASKA STAGE 4 DRAINAGE & LEVEES PLAN & PROFILE STA. 36+70 TO STA. 45+50			
CAD FILE NAME: M10P005.DWG DATE: 07-20-92		DRAWING NUMBER: M34-CH-R-64/224		SHEET 25 OF 119	





VERTICAL CONTROL POINT

BM-95 - EL. 728.22 (M.S.L. 1929 ADJ.)
STD. 3" BRASS DISC ON TOP OF S.E.
WINGWALL OF BR# 9010 TH 41
OVER MINNESOTA RIVER.

HORIZONTAL CONTROL POINT

STA. 42DJB2
E 2,104,028.783
N 850,372.857

NOTES:

- ELEVATIONS REFER TO M.S.L. (1929 ADJ.)
- COORDINATES AND GRID FOR PROJECT ARE LAMBERT GRID, MINNESOTA SOUTH ZONE.
- EXISTING TOPOGRAPHIC GROUND LINES MAY VARY FROM THOSE SHOWN ON PLANS.
- SIDE DITCH SLOPES VARY TO 6% MAX.
- REMOVE EXISTING LIFT STATION, GATE VALVE MH, AND ALL MISC. ITEMS.
- BUILDINGS TO BE REMOVED BY OTHERS. CONTRACTOR SHALL REMOVE SLAB OR FOUNDATION AND BACKFILL WITH GRANULAR MATERIAL.
- FOR APPROXIMATE LIMITS OF SHEET PILING SEE DRAWING 64/271
- CONSTRUCT SIDE DITCH ALONG LANDWARD OF LEVEE BERM TO DIRECT RUNOFF INTO INTERCEPTOR PIPE INLETS.
- EXISTING DISTRIBUTION POWER LINES, POLES, AND GUY WIRES TO BE RELOCATED BY CITY FORCES.
- ALL WATER MAIN, SANITARY SEWER AND FORCE MAINS BENEATH PROPOSED LEVEE SHALL BE REMOVED.
- BEGIN SAFETY RAILING STA. 0+308, SEE LANDSCAPE DRAWINGS.
- PROPOSED CURB ELEVATIONS TO BE VERIFIED IN FIELD TO ALLOW WATER FROM SIDE DITCH TO DRAIN INTO INLETS. TOP OF GRATE ELEVATIONS ESTABLISHED IN INLET CHART ON SHEET 64/252 CONTROLS.
- PROPOSED CURB & GUTTER IN ASH TO HAVE OUTFALL GUTTER TO INLET 11A. FIELD VERIFY TOP OF CURB ELEVATIONS AND PROVIDE CURB CUTS TO ALLOW SIDE DITCH TO DRAIN INTO INLETS.

REFERENCES:

DWG NO.

1. GENERAL PLAN	10/201
2. LEVEE ALIGNMENT	64/218
3. EAST INTERCEPTOR	64/255
4. WEST INTERCEPTOR	64/256
5. INLET SCHEDULE	64/252
6. TRAIL ALIGNMENT (RAMP-B)	64/219
7. RELIEF WELL	64/254
8. PUMP STATION	64/278
10. GATEWELL C	64/283
11. OUTLET C	64/282
12. TRAIL PROFILE & SECTION	64/240
13. TEMPORARY EROSION CONTROL DETAILS	64/237
14. INTERLOCKING CONCRETE MODULAR UNITS	64/238

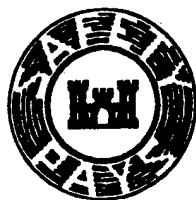
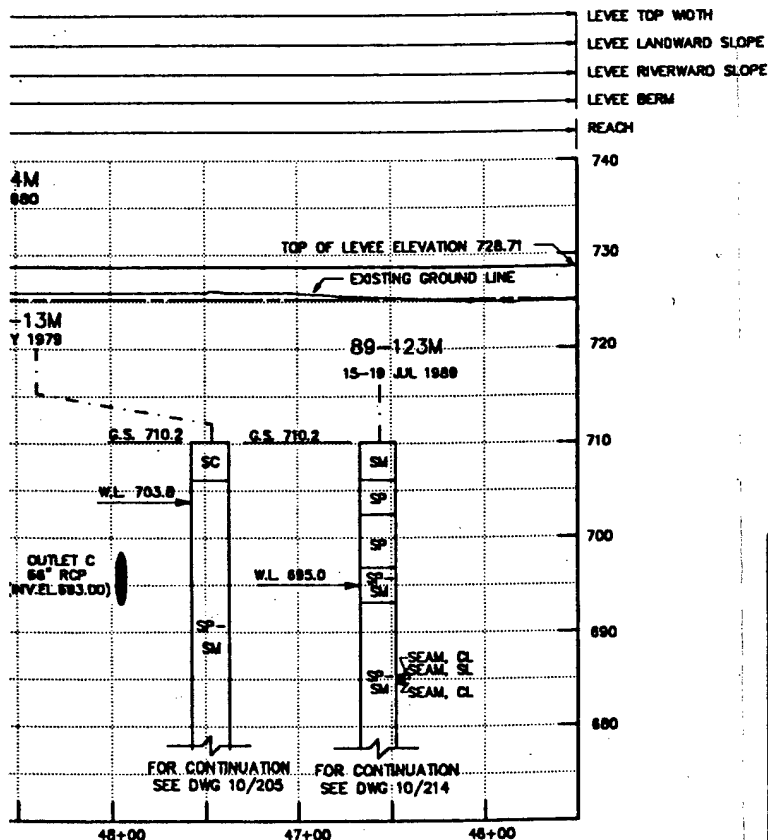
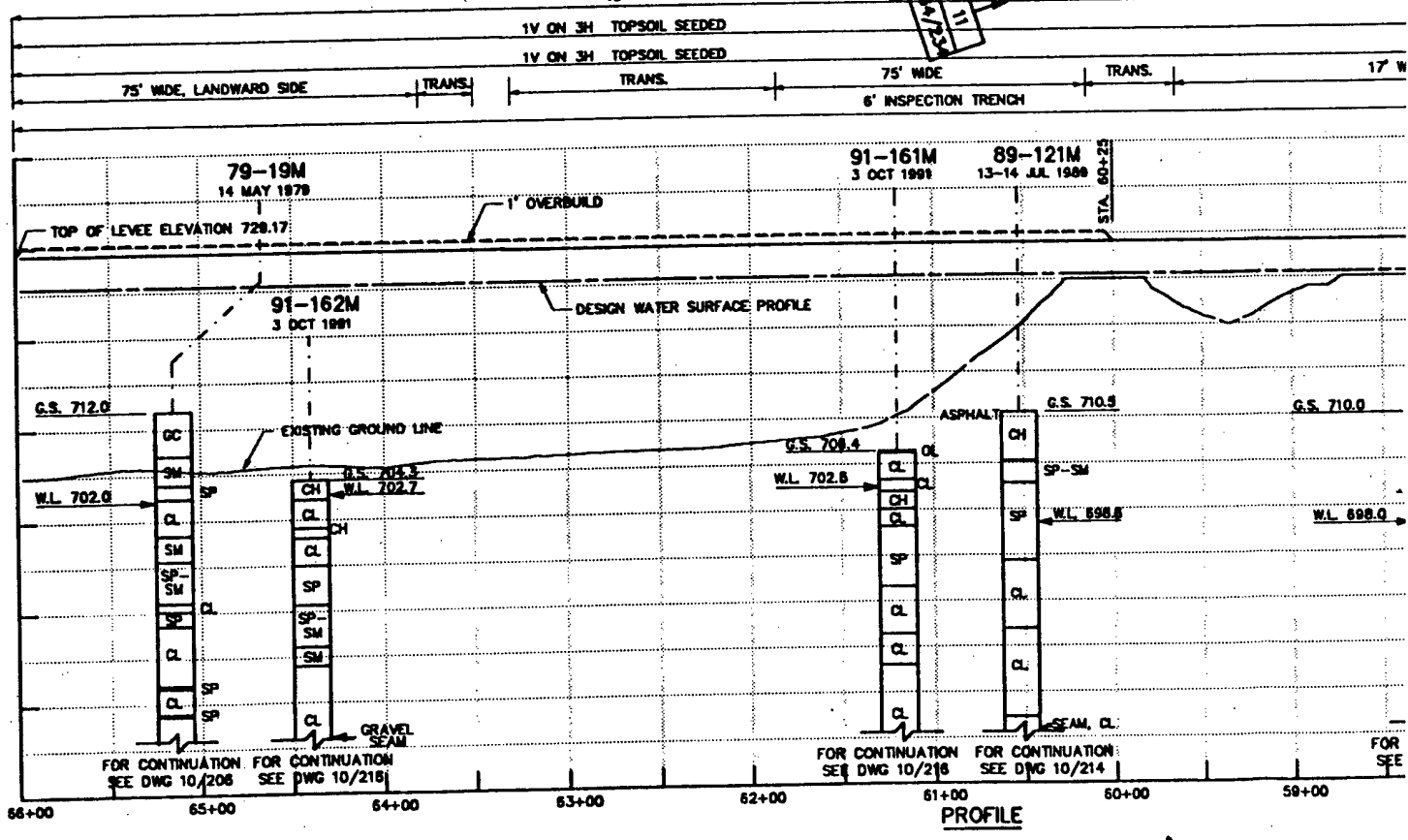
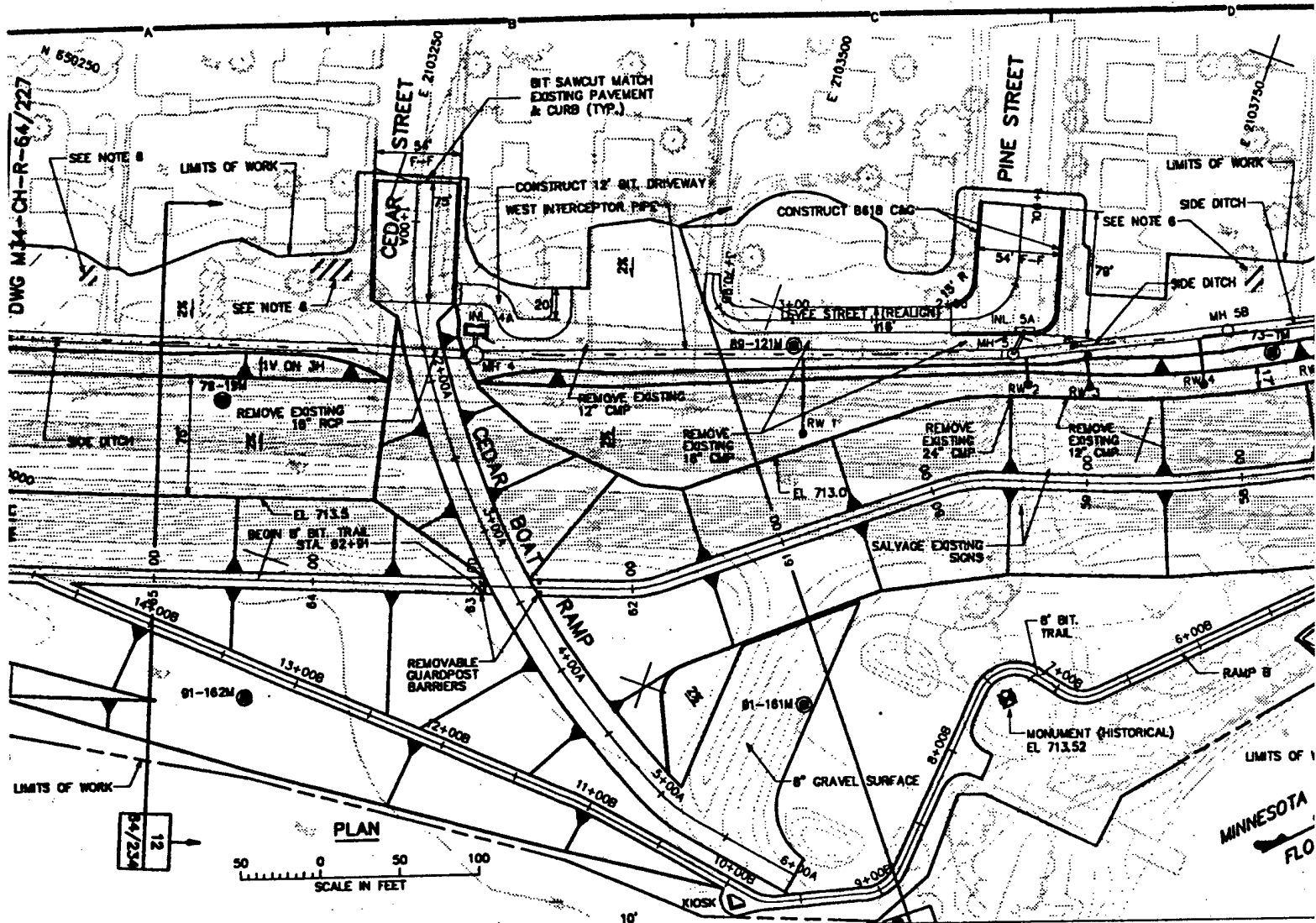
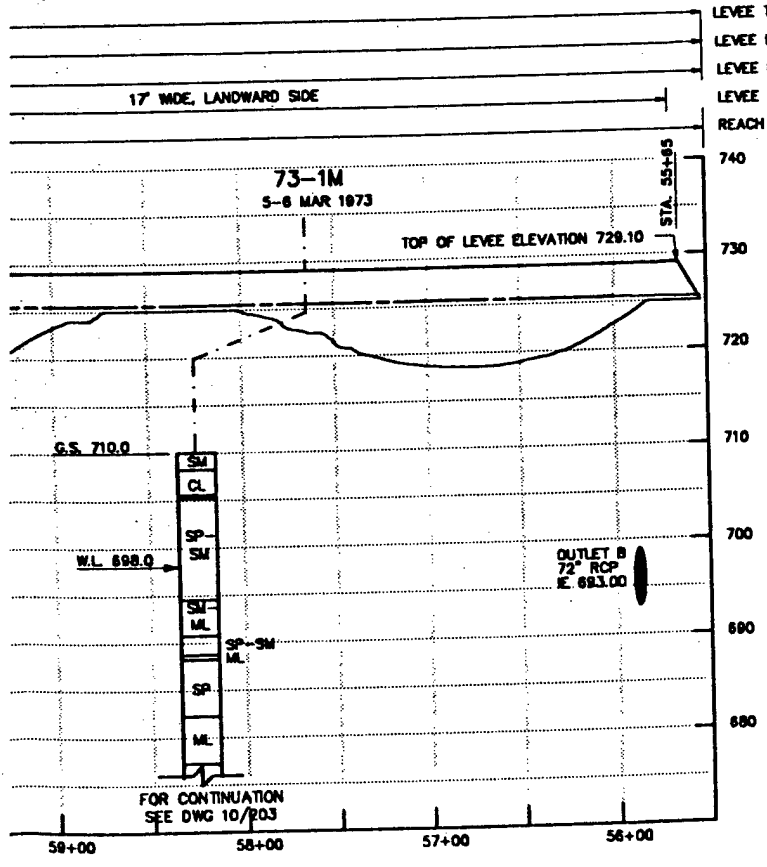
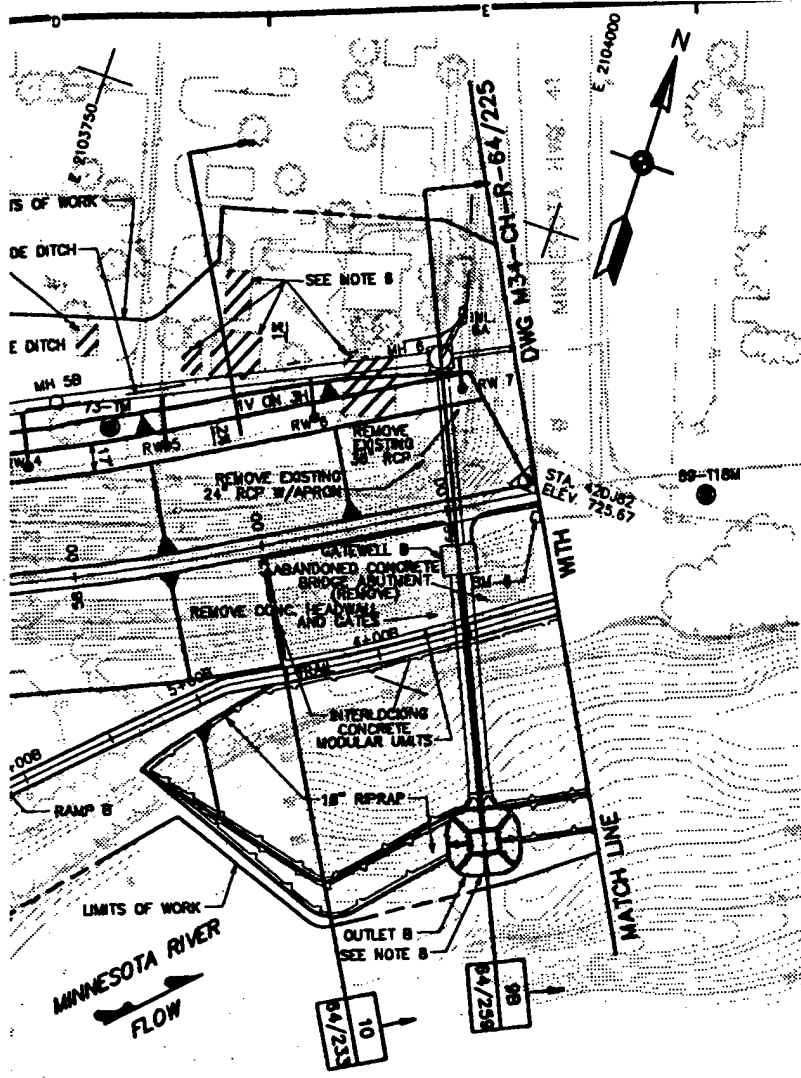


Figure 19

SYMBOL		DESCRIPTION		DATE	APPROVAL
B R W		PLANNING TRANSPORTATION ENGINEERING URBAN DESIGN		DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA	
DESIGNED: TJS		FLOOD CONTROL - MINNESOTA RIVER CHASKA PROJECT CHASKA, MINNESOTA CHASKA STAGE 4 DRAINAGE & LEVEES PLAN & PROFILE STA. 45+50 TO STA. 55+50			
DRAWN: RSC					
CHECKED: TJS					
SUBMITTED BY:					
ED-9		CAD FILE NAME: MNTOP006.DWG		DRAWING NUMBER:	SHT 26
DATE: 07-29-92		SPEC NO:		M34-CH-R-64/225	OF 119





VERTICAL CONTROL POINT

BM-JS - EL. 726.22 (M.S.L. 1929 ADJ.)
 STD. 3\"/>

HORIZONTAL CONTROL POINT

STA. 420.82
 E 2,104,028.763
 N 850,372.857

NOTES:

- ELEVATIONS REFER TO M.S.L. (1929 ADJ.)
- COORDINATES AND GRID FOR PROJECT ARE LAMBERT GRID, MINNESOTA SOUTH ZONE.
- EXISTING TOPOGRAPHIC GROUND LINES MAY VARY FROM THOSE SHOWN ON PLANS.
- SIDE DITCH SLOPES VARY TO 6% MAX.
- PLACE REMOVABLE GUARDPOST BARRIERS AT STA. 62+57 AND STA. 62+82
- BUILDINGS TO BE REMOVED BY OTHERS. CONTRACTOR SHALL REMOVE SLAB OR FOUNDATION AND BACKFILL WITH GRANULAR MATERIAL.
- CONSTRUCT SIDE DITCH ALONG LANDWARD OF LEVEE BERM TO DIRECT RUNOFF INTO INTERCEPTOR PIPE INLETS.
- FOR APPROXIMATE LIMITS OF SHEET PILING SEE DRAWING 64/272
- EXISTING DISTRIBUTION POWER LINES, POLES, AND GUY WIRES TO BE RELOCATED BY CITY FORCES.
- ALL WATER MAIN, SANITARY SEWER AND FORCE MAINS BENEATH PROPOSED LEVEE SHALL BE REMOVED.
- END SAFETY RAILING STA. 4+328. SEE LANDSCAPE DRAWINGS.
- PROPOSED CURB ELEVATIONS TO BE VERIFIED IN FIELD TO ALLOW WATER FROM SIDE DITCH TO DRAIN INTO INLETS. TOP OF GRATE ELEVATIONS ESTABLISHED IN INLET CHART ON SHEET 64/252 CONTROLS.
- PROPOSED CURB & GUTTER IN ASH TO HAVE OUTFALL GUTTER TO INLET 11A. FIELD VERIFY SIDE OF CURB ELEVATIONS AND PROVIDE CURB CUTS TO ALLOW SIDE DITCH TO DRAIN INTO INLETS.

REFERENCES:

	DWG NO.
1. GENERAL PLAN	10/201
2. LEVEE ALIGNMENT	64/218
3. WEST INTERCEPTOR	64/256
4. INLET SCHEDULE	64/252
5. CEDAR BOAT RAMP ALIGNMENT (RAMP A)	64/219
6. TRAIL ALIGNMENT (RAMP B)	64/219
7. RELIEF WELL	64/254
8. OUTLET B	64/258
9. GATEWELL B	64/260
10. REMOVABLE GUARDPOST BARRIERS	64/307
11. LEVEE STREET ALIGNMENT	64/218
12. TRAIL PROFILE & SECTION (RAMP B)	64/240
13. CEDAR BOAT RAMP PROFILE & SECTION (RAMP A)	64/238
14. LEVEE STREET PROFILE & SECTION	64/245
15. TEMPORARY EROSION CONTROL DETAILS	64/237
16. INTERLOCKING CONCRETE MODULAR UNITS	64/238
17. KIOSK/BENCH DETAILS	64/308

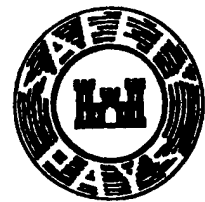
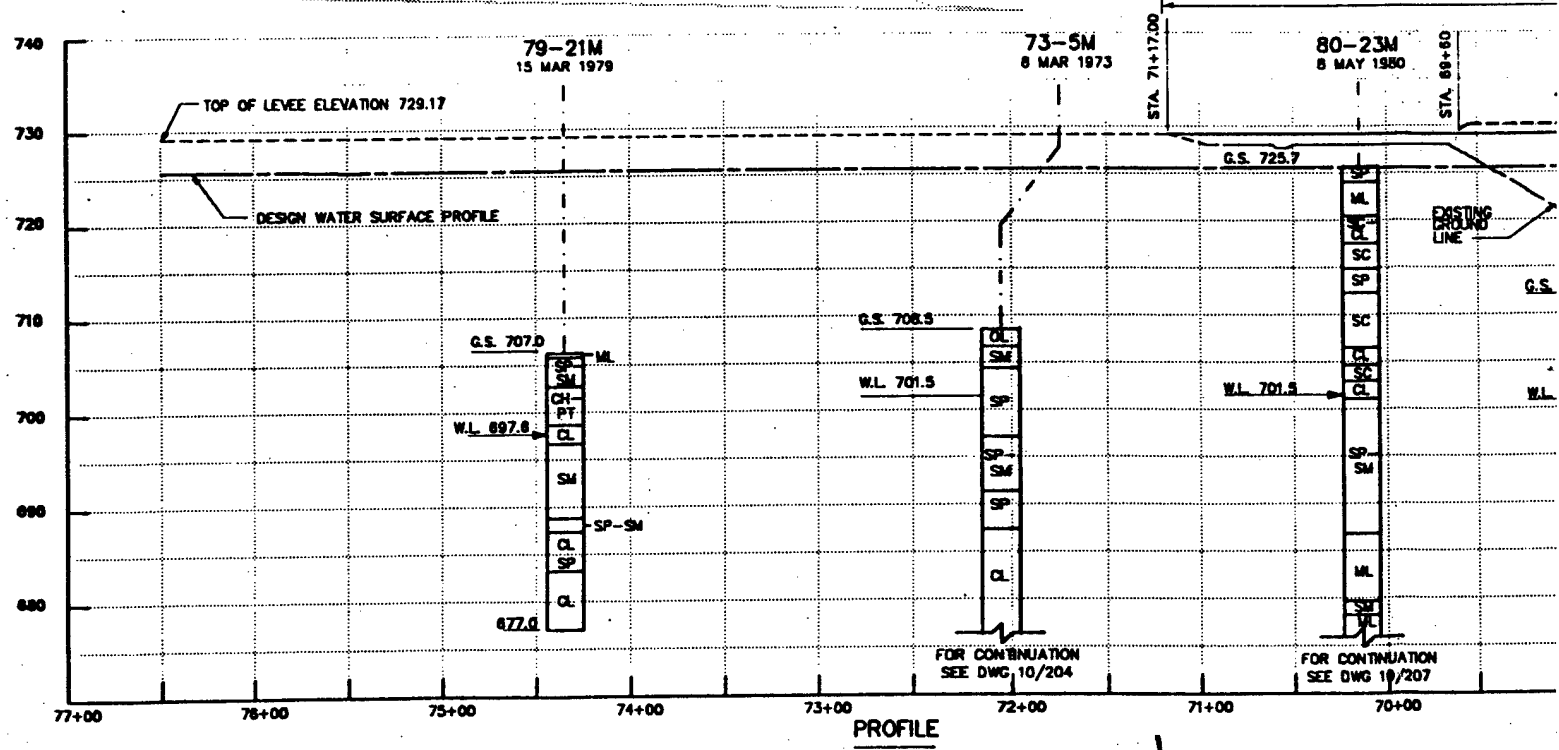
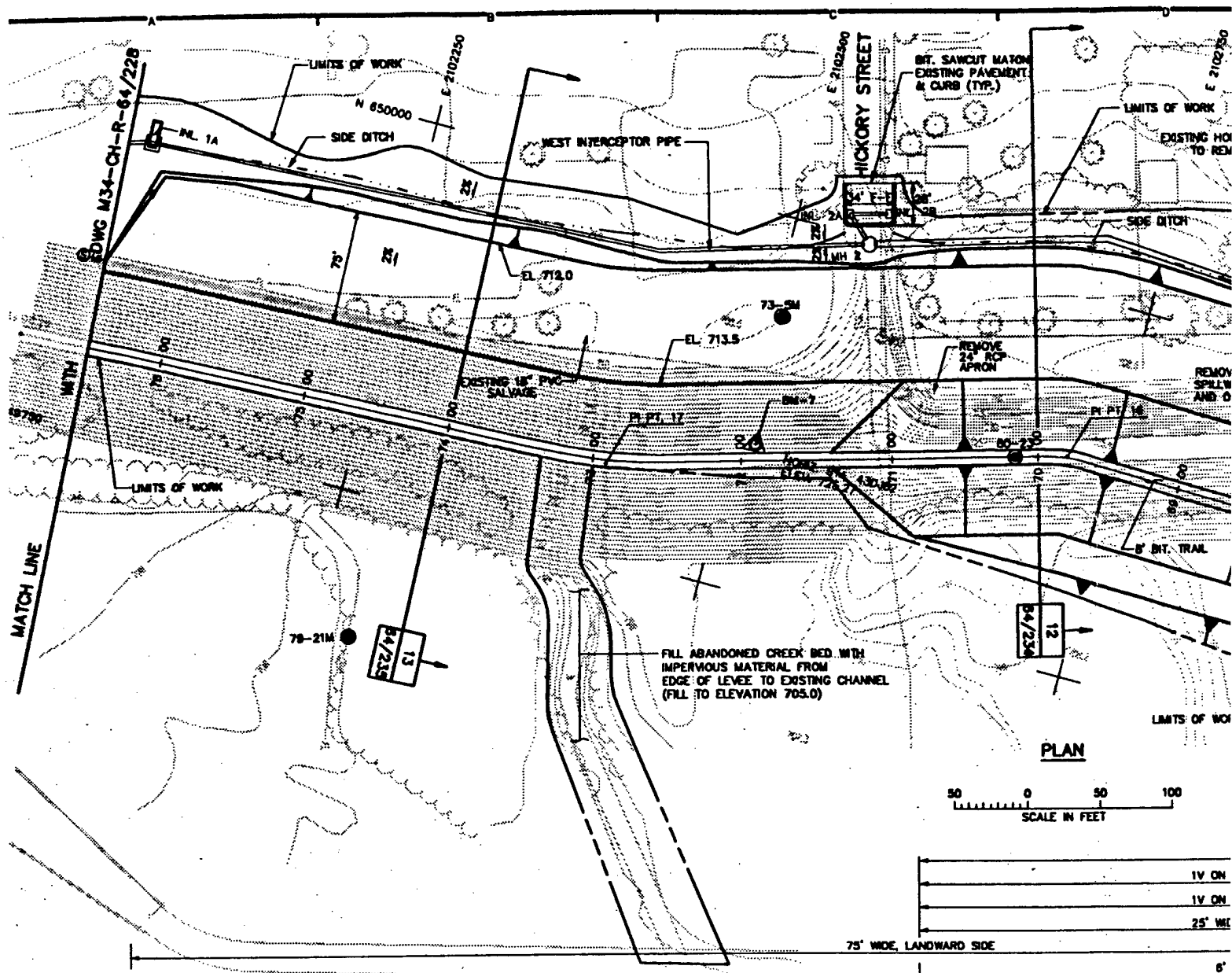
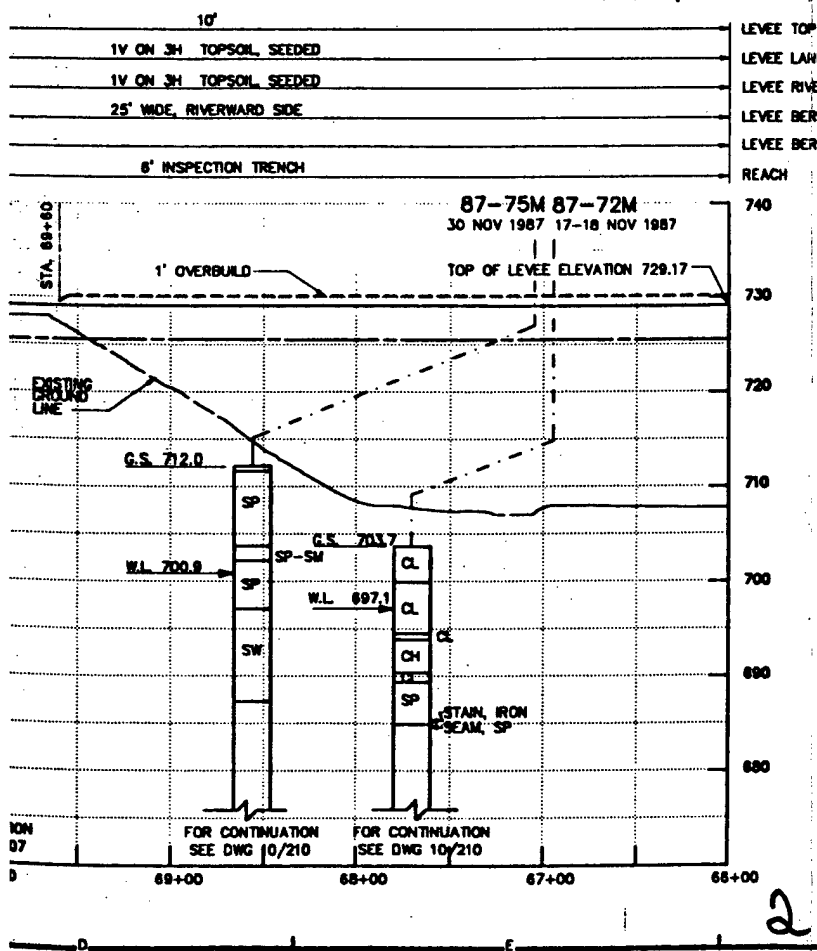
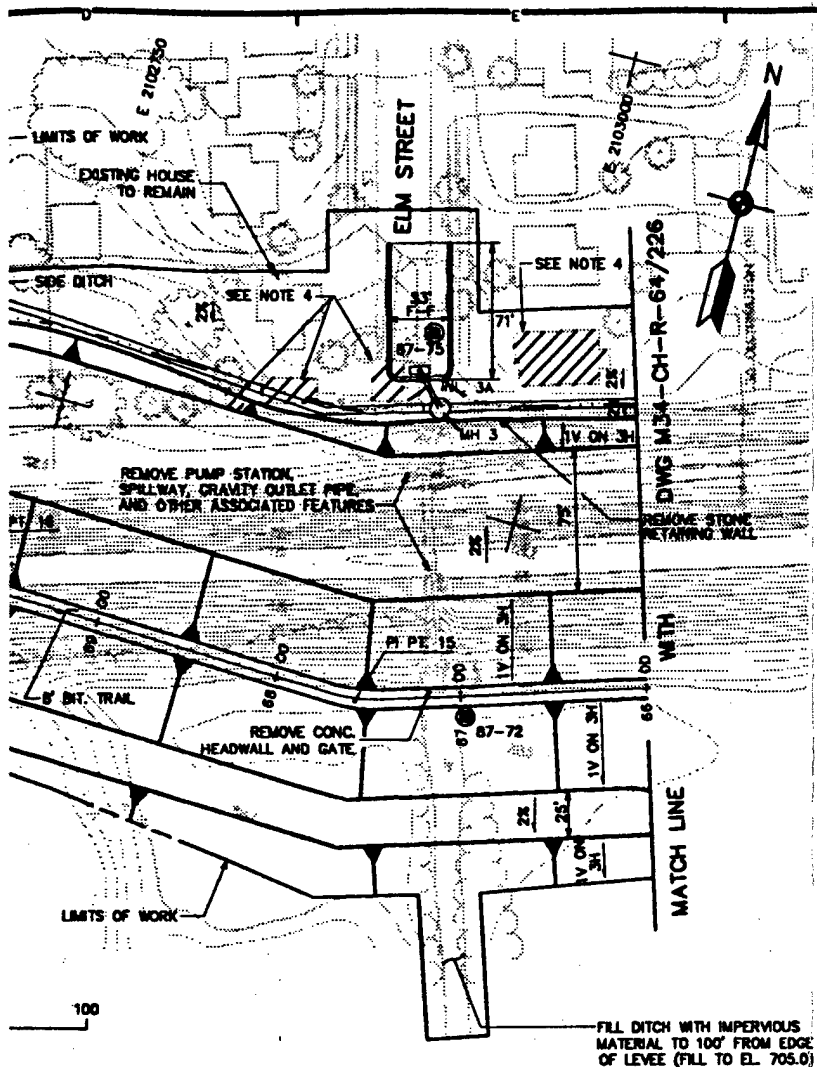


FIGURE 20

SYMBOL		DESCRIPTION		DATE	APPROVAL
		PLANNING TRANSPORTATION ENGINEERING URBAN DESIGN		DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA	
DESIGNED: TJS DRAWN: RSC CHECKED: TJS SUBMITTED BY:		FLOOD CONTROL - MINNESOTA RIVER CHASKA PROJECT - CHASKA, MINNESOTA CHASKA STAGE 4 DRAINAGE & LEVEES PLAN & PROFILE STA. 55+50 TO STA. 66+00			
ED-0 ED-GH DATE: 07-29-92		CAD FILE NAME: MN10P007.DWG SPEC NO:		DRAWING NUMBER: M34-CH-R-64/226 SHIT 27 OF 119	





VERTICAL CONTROL POINT

BM-87 - EL. 725.27 TOP 1 3/4" CAP
STAMPED 43DJB2 WEST OF HICKORY
NEAR TOP OF LEVEE

HORIZONTAL CONTROL POINT

STA. 43DJB2
E 2,102,512.420
N 848,848.248

NOTES:


- ELEVATIONS REFER TO M.S.L. (1929 ADJ.)
- COORDINATES AND GRID FOR PROJECT ARE LAMBERT GRID, MINNESOTA SOUTH ZONE.
- EXISTING TOPOGRAPHIC GROUND LINES MAY VARY FROM THOSE SHOWN ON PLANS.
- BUILDINGS TO BE REMOVED BY OTHERS, CONTRACTOR SHALL REMOVE SLAB OR FOUNDATION AND BACKFILL WITH GRANULAR MATERIAL.
- SIDE DITCH SLOPES VARY TO 6% MAX.
- CONSTRUCT SIDE DITCH ALONG LANDWARD SIDE OF LEVEE BERM TO DIRECT RUNOFF INTO INTERCEPTOR PIPE INLETS.
- EXISTING DISTRIBUTION POWER LINES, POLES, AND GUY WIRES TO BE RELOCATED BY CITY FORCES.
- ALL WATER MAIN, SANITARY SEWER AND FORCE MAINS BENEATH PROPOSED LEVEE SHALL BE REMOVED.
- SALVAGE EXISTING GUARDPOSTS AT STA. 71+70, AND RELOCATE.
- EXISTING 10' AGGREGATE TRAIL ON LEVEE, STA. 71+20 TO STA. 83+20, TO REMAIN.
- REMOVE STONE RETAINING WALL STA. 68+75 TO STA. 68+20
- PROPOSED CURB ELEVATIONS TO BE VERIFIED IN FIELD TO ALLOW WATER FROM SIDE DITCH TO DRAIN INTO INLETS. TOP OF GRATE ELEVATIONS ESTABLISHED IN INLET CHART ON SHEET 64/232 CONTROLS.
- PROPOSED CURB & GUTTER IN ASH TO HAVE OUTFALL GUTTER TO INLET 11A. FIELD VERIFY TOP OF CURB ELEVATIONS AND PROVIDE CURB CUTS TO ALLOW SIDE DITCH TO DRAIN INTO INLETS.

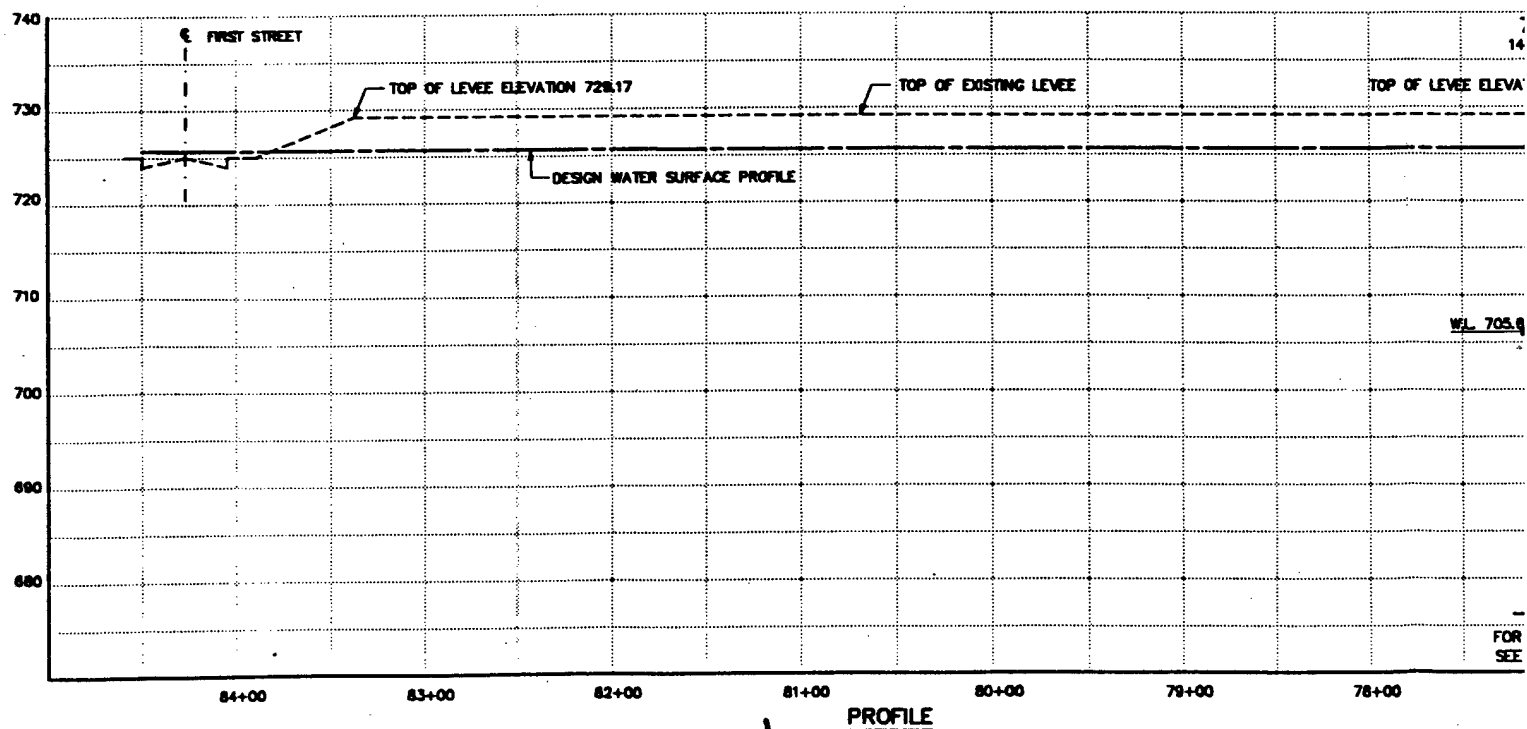
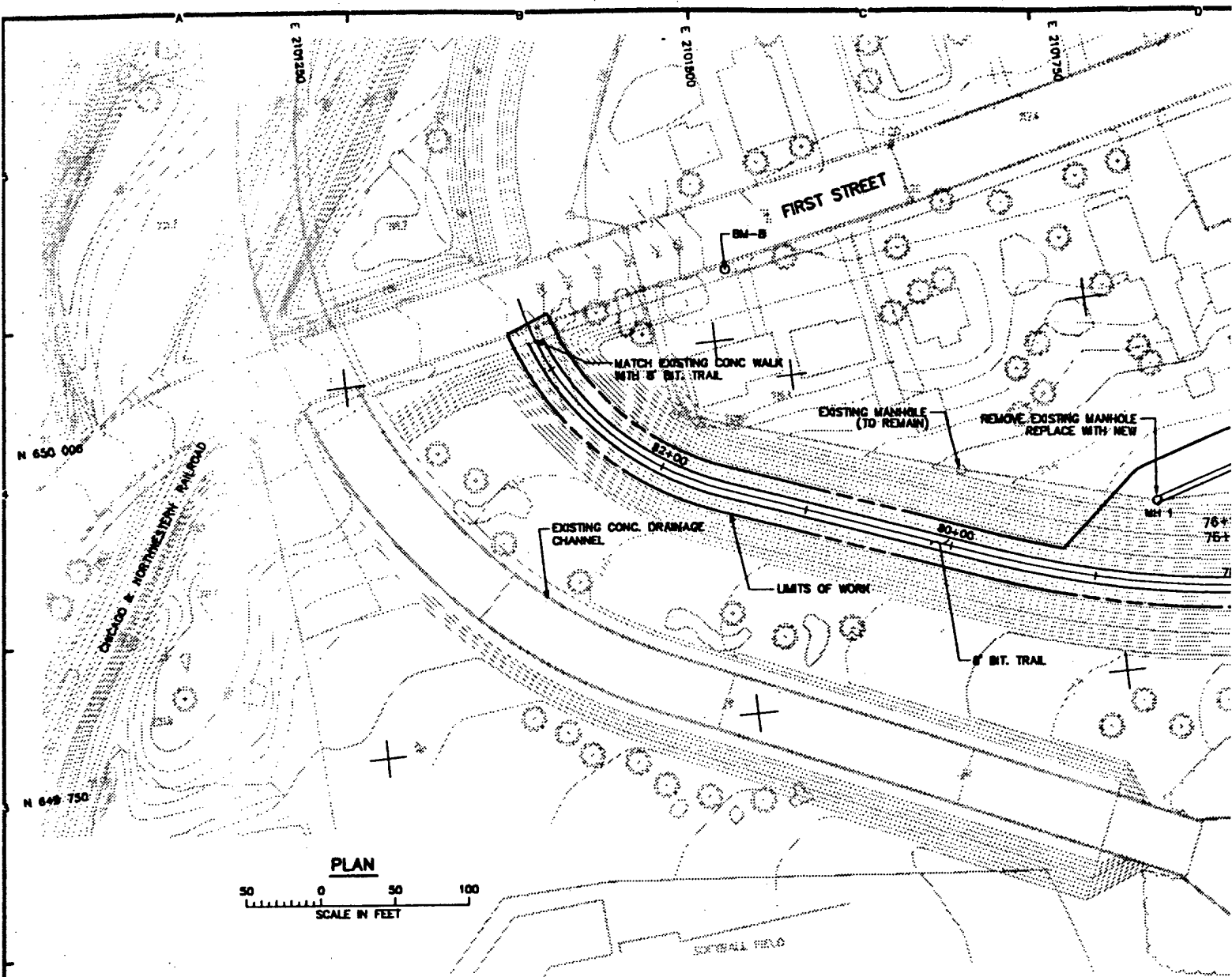
REFERENCES:

	DWG NO.
1. GENERAL PLAN	10/201
2. LEVEE ALIGNMENT	64/218
3. WEST INTERCEPTOR	64/258
4. INLET SCHEDULE	64/252
5. TEMPORARY EROSION CONTROL DETAILS	64/237



FIGURE 21

SYMBOL		DESCRIPTION		DATE	APPROVAL
		PLANNING TRANSPORTATION ENGINEERING URBAN DESIGN		DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA	
DESIGNED: TJS DRAWN: RSC CHECKED: TJS SUBMITTED BY:		FLOOD CONTROL - MINNESOTA RIVER CHASKA PROJECT CHASKA, MINNESOTA CHASKA STAGE 4 DRAINAGE & LEVEES PLAN & PROFILE STA. 66+00 TO STA. 76+50			
ED-9 ED-6H		CAD FILE NAME: MN10P008.DWG SPEC NO:		DRAWING NUMBER: M34-CH-R-64/227 SHT 28 OF 119	



VERTICAL CONTROL POINT

BM-#5 - EL. 721.52 TOP NUT HYDRANT
ON SO SIDE 1ST STREET
AT HOUSE NO. 837

NOTES:

1. ELEVATIONS REFER TO M.S.L. (1929 ADJ.)
2. COORDINATES AND GRID FOR PROJECT ARE LAMBERT GRID, MINNESOTA SOUTH ZONE.
3. EXISTING TOPOGRAPHIC GROUND LINES MAY VARY FROM THOSE SHOWN ON PLANS.
4. CONTINUE 8" BIT TRAIL ON EXISTING LEVEE (STAGE 2) TO MATCH EXISTING CONCRETE SIDEWALK SOUTH SIDE OF FIRST STREET.
5. REMOVE & REPLACE EXISTING GUARD POSTS AT STA. 83+15.
6. PLACE 8" BIT. TRAIL ON LEVEE AFTER TRUCKS ARE DONE HAULING.
7. CONTRACTOR TO REGRADE OR ADD CL.5 100% CRUSHED ON TOP OF STAGE 2 LEVEE AS NECESSARY TO BRING BACK TO GRADE AFTER HAULING AND PRIOR TO PAVING.

REFERENCES:

	DWG NO.
1. GENERAL PLAN	10/201
2. LEVEE ALIGNMENT	84/218
3. WEST INTERCEPTOR	84/258
4. TEMPORARY EROSION CONTROL DETAILS	84/237
5. BITUMINOUS TRAIL TYPICAL	84/238

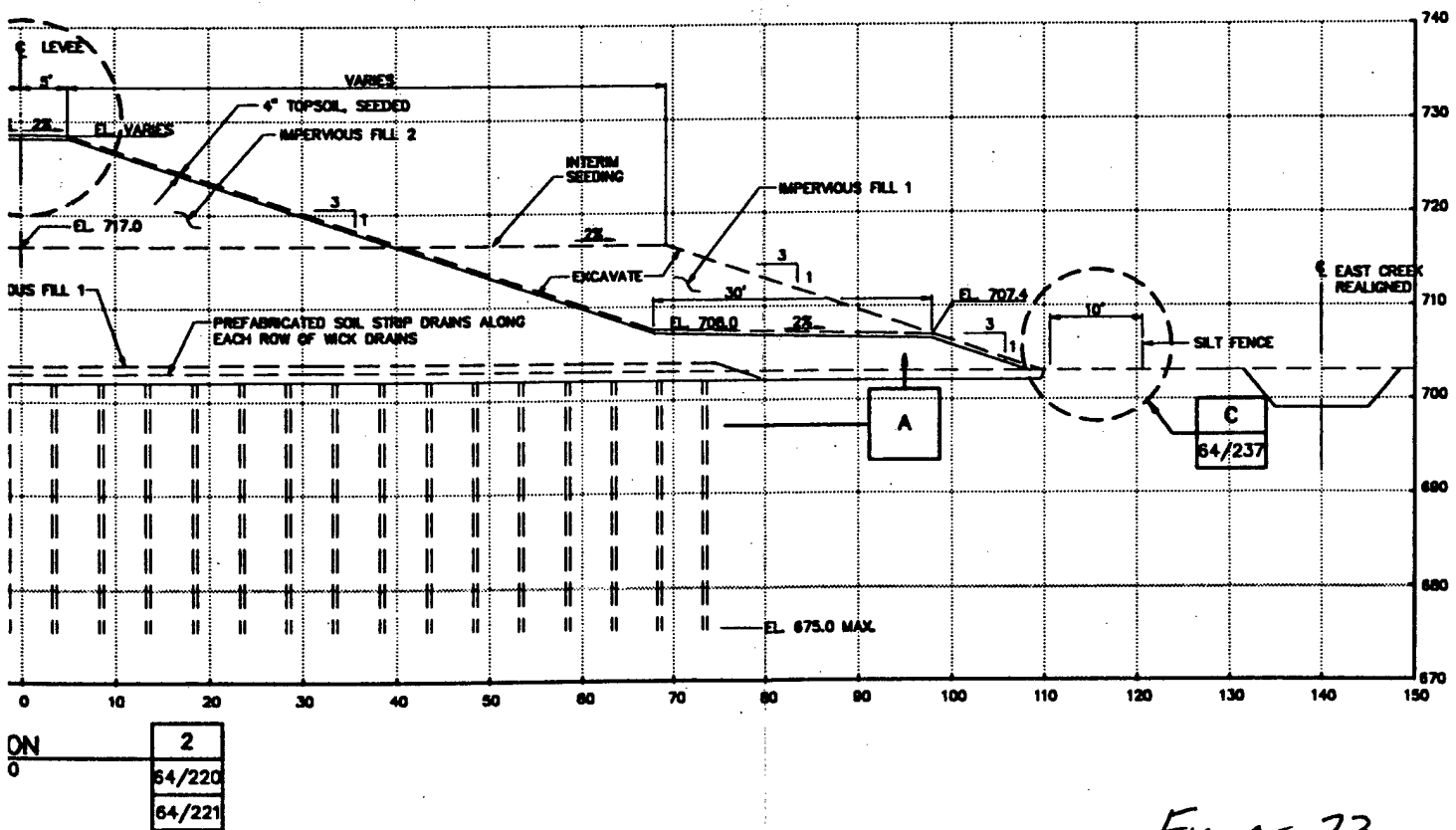
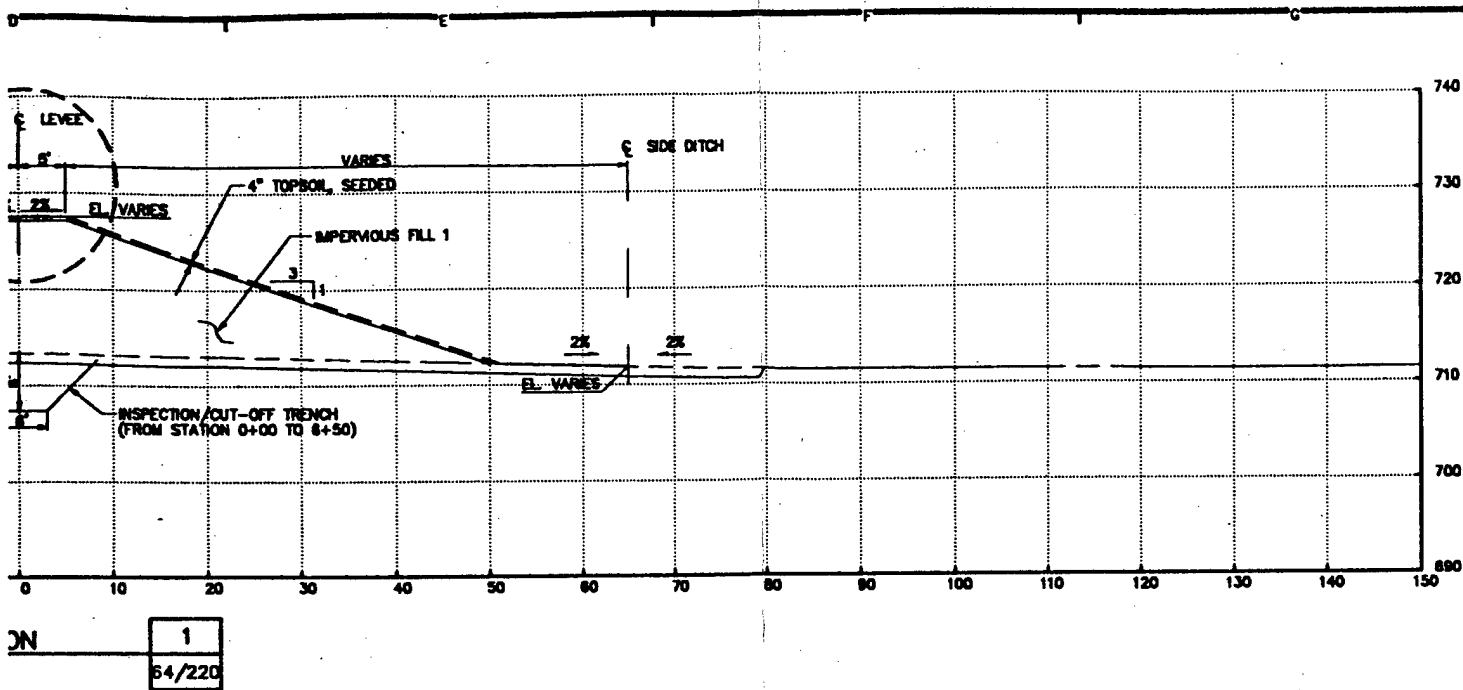
DWG NO.

1. GENERAL PLAN	10/201
2. LEVEE ALIGNMENT	84/218
3. WEST INTERCEPTOR	84/258
4. TEMPORARY EROSION CONTROL DETAILS	84/237
5. BITUMINOUS TRAIL TYPICAL	84/238

FIGURE 22

SYMBOL		DESCRIPTION		DATE	APPRO
B R W		PLANNING TRANSPORTATION ENGINEERING URBAN DESIGN		DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA	
DESIGNED: TJS		FLOOD CONTROL - MINNESOTA RIVER CHASKA PROJECT CHASKA, MINNESOTA CHASKA STAGE 4 DRAINAGE & LEVEES PLAN & PROFILE STA. 76+50 TO 83+50			
DRAWN: RSC		ED-0			
CHECKED: TJS		ED-04			
SUBMITTED BY:		CAD FILE NAME: MN10P009.DGW			
DATE: 07-29-92		SPEC NO:		DRAWING NUMBER: M34-CH-R-84/228	
				SHEET 21 OF 11	





OR STAGE 1 CONSTRUCTION AT STA. 7+60.
OPENING FOR EAST CREEK REALIGNMENT STA. 8+50
TO BE CONSTRUCTED UNDER STAGE 3.
TION OF THE LEVEE INVOLVING THE PERVIOUS FILL,
LD, ETC., SHOWN IS TO BE CONSTRUCTED
ITA. 28+85.

TRENCH TO BE 6' MIN., OR 2 FEET BENEATH ANY
RAVELOR AS DIRECTED BY THE ENGINEER.
OF SURCHARGE STA. 9+50 TO STA. 10+60

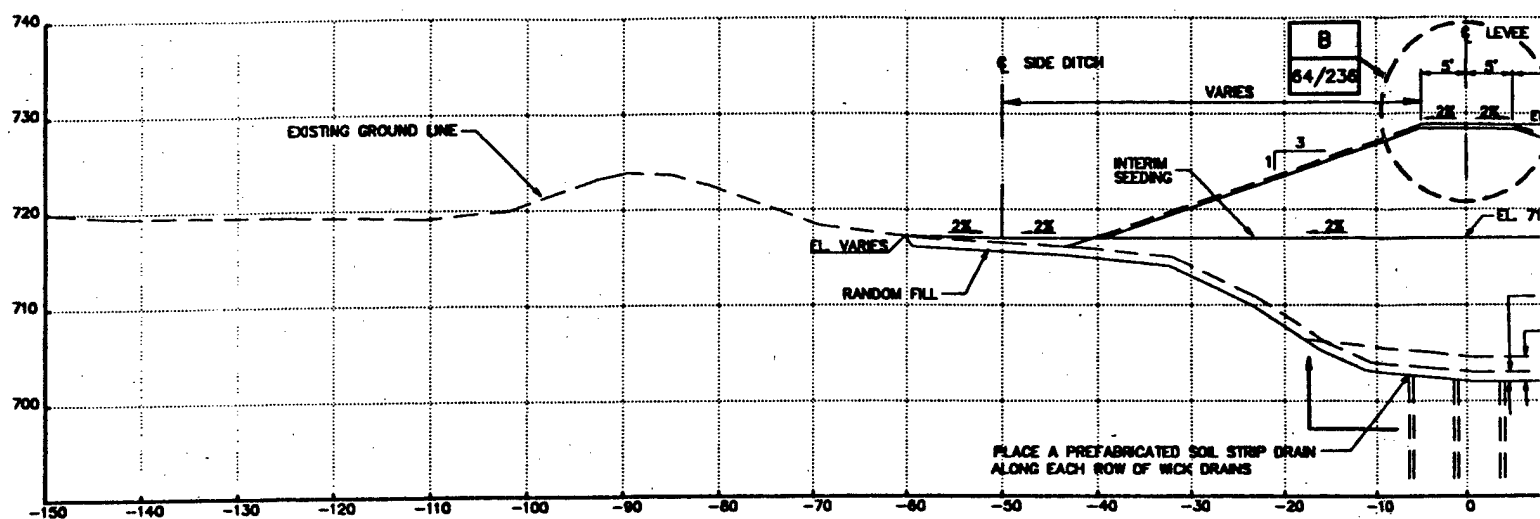
DWG. NO.

CONTROL DETAILS - - - - - 64/237

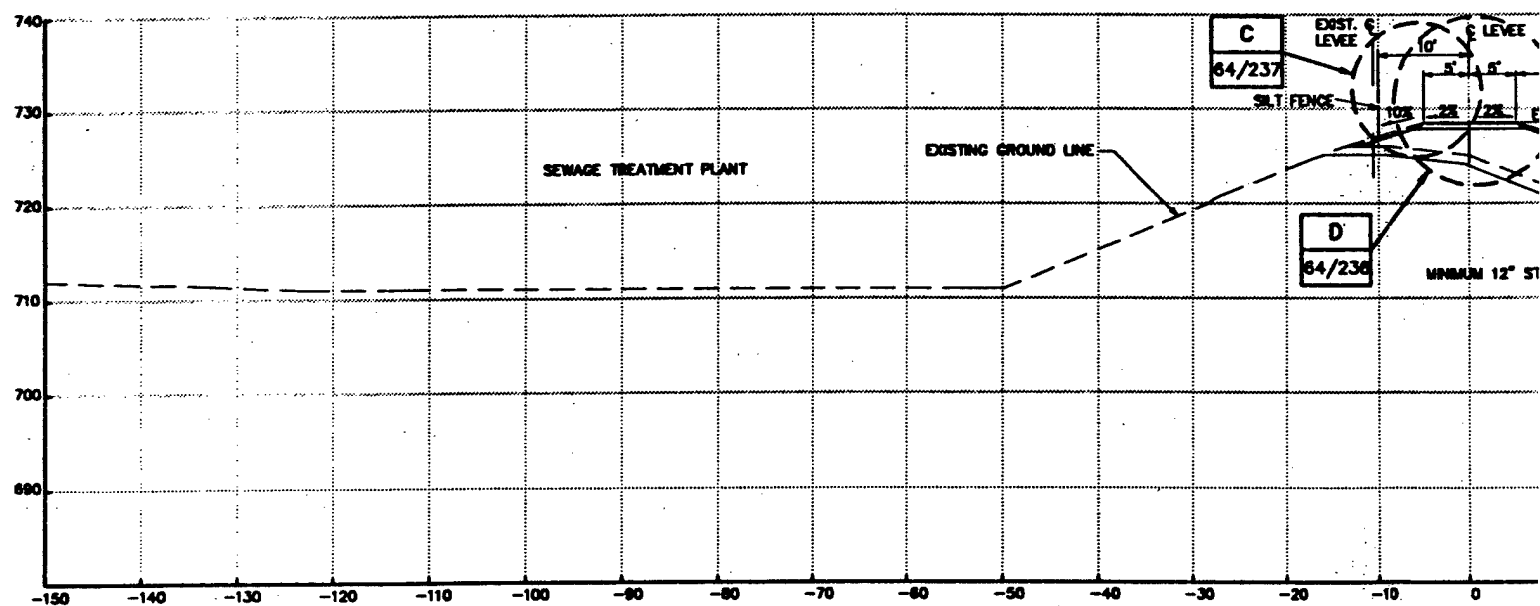


SYMBOL	DESCRIPTION	DATE	APPROVAL
<p align="center">BRW</p> <p align="center">PLANNING TRANSPORTATION ENGINEERING URBAN DESIGN</p> <p align="center">DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA</p>			
<p align="center">FLOOD CONTROL - MINNESOTA RIVER CHASKA PROJECT CHASKA, MINNESOTA CHASKA STAGE 4 DRAINAGE & LEVEES LEVEE TYPICAL SECTIONS STA. 0+00 TO STA. 21+00</p>			
DESIGNED: TJS	CAD FILE NAME: MN10TYP1.DWG		
DRAWN: IKR	DRAWING NUMBER: M34-CH-R-64/229		
CHECKED: TJS	SHEET 30 OF 119		
SUBMITTED BY:	DATE: 07-29-92		
ED-0	SPEC NO:		

FIGURE 23



TYPICAL SECTION
STA. 21+00 TO STA.



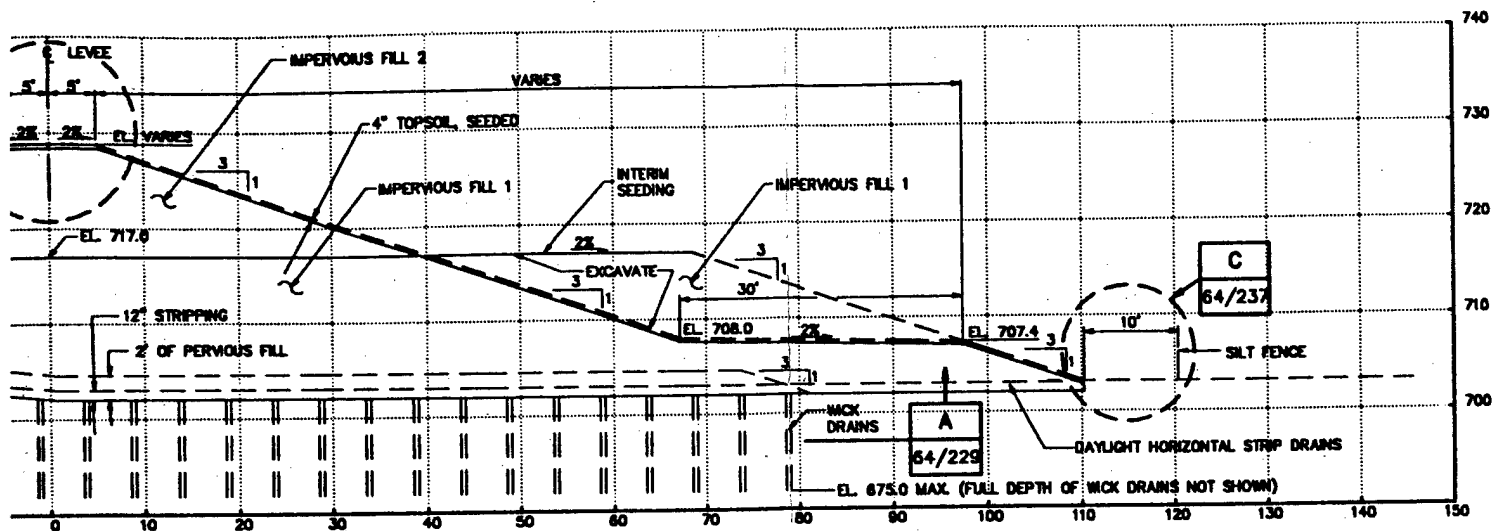
TYPICAL SECTION
STA. 28+85 TO STA.

NOTES:

1. 8' PATH TIES INTO EXISTING BRID
2. PLACE TEMPORARY SILT FENCE A
SEWAGE TREATMENT PLANT.
3. MINIMUM 6" STRIPPING ON LANDW
AT STA. 34+50.

REFERENCES:

- ## 1. TEMPORARY EROSION CONTROL DI

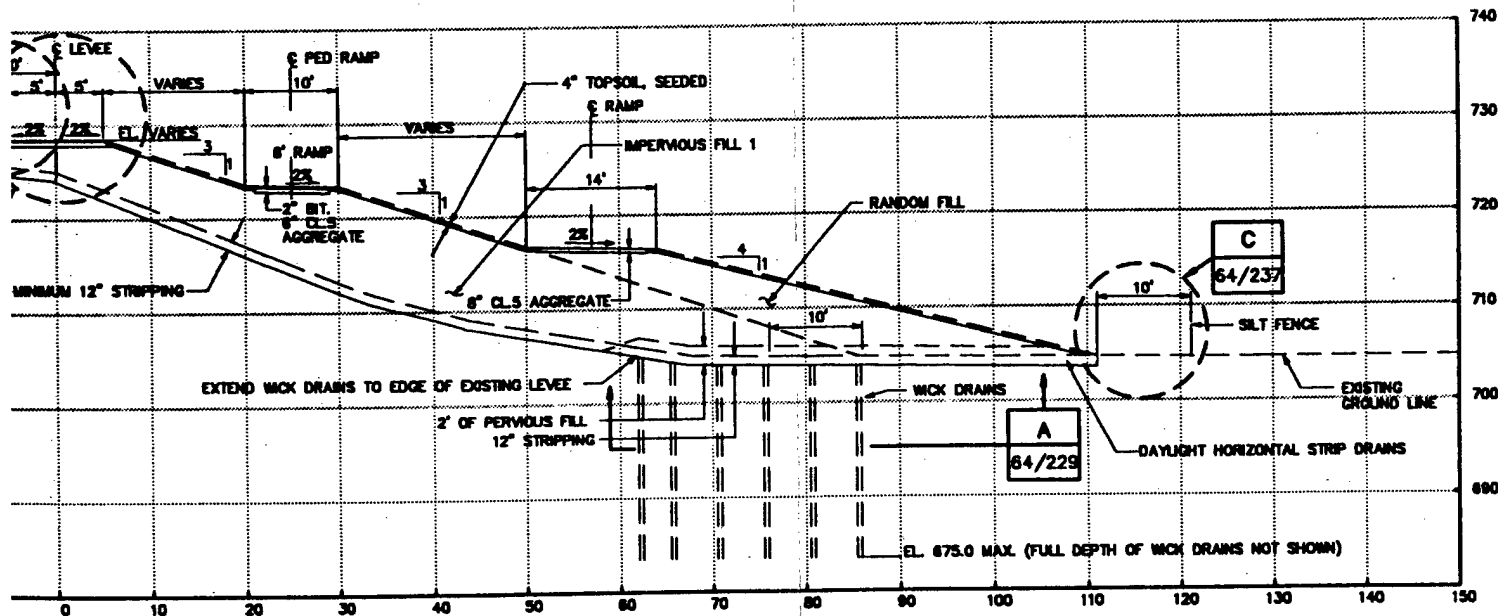


L SECTION

00 TO STA. 28+85

3

64/222



AL SECTION

+85 TO STA. 32+00

4

64/223

D EXISTING BRIDGE AT STA. 30+25±.
Y SILT FENCE AT THE TOP OF EXISTING LEVEE TO PROTECT
NT PLANT.
PING ON LANDWARD SIDE OF EXISTING LEVEE BEGINNING

DWG. NO.

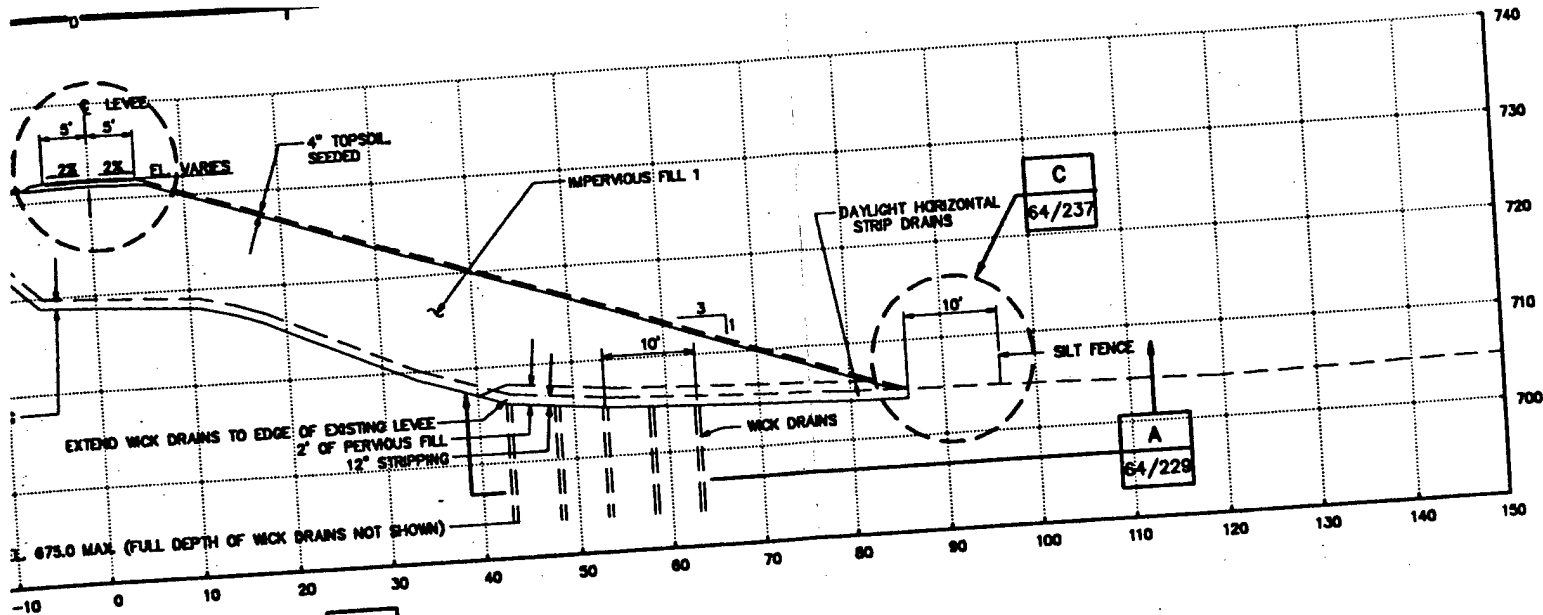
NON. CONTROL DETAILS — — — — — 64/237



2

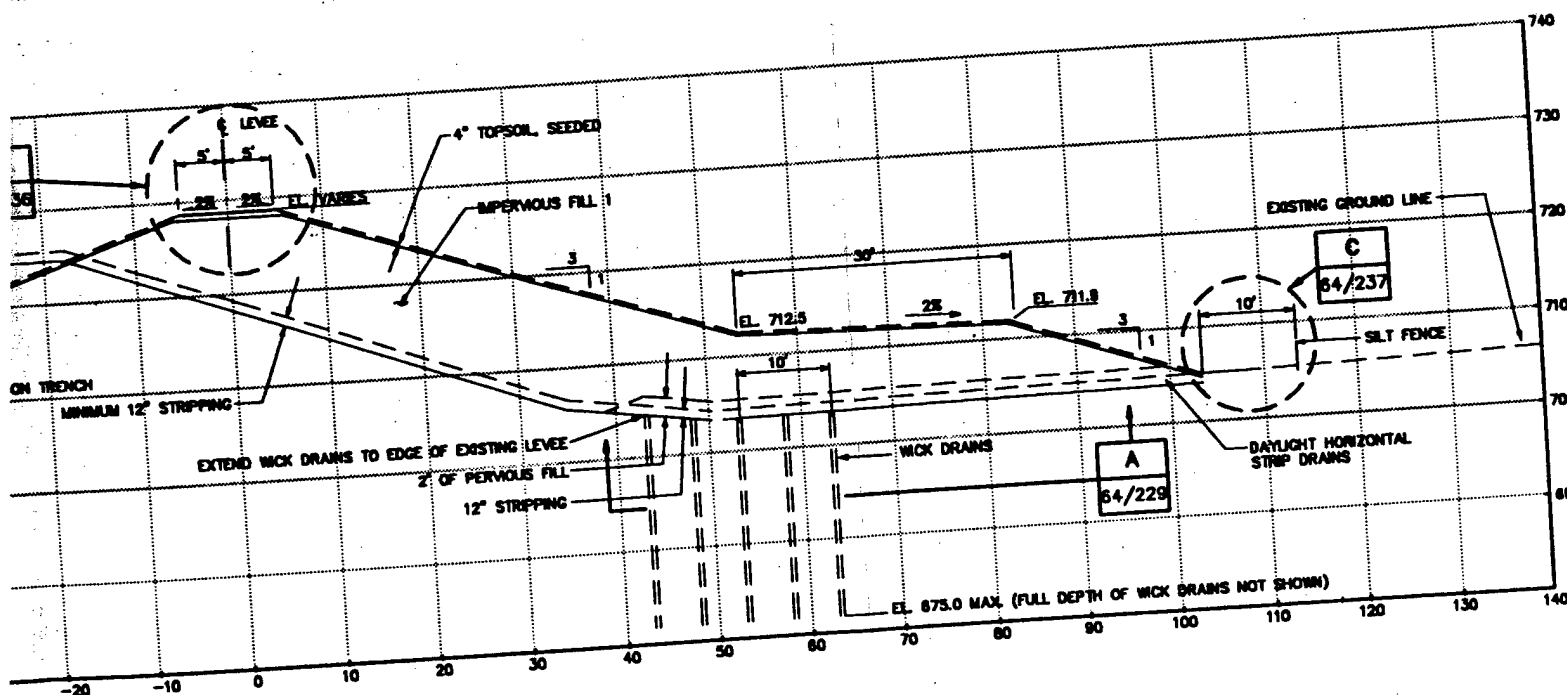
FIGURE 24

SYMBOL	DESCRIPTION	DATE	APPROVAL
<div style="display: flex; justify-content: space-between;"> <div> <p>BRW</p> <p>DESIGNED: TJS DRAFTER: IKR CHECKED: TJS SUBMITTED BY:</p> </div> <div> <p>PLANNING TRANSPORTATION ENGINEERING JANIS DESIGN</p> </div> <div> <p>DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA</p> </div> </div>			
<p>FLOOD CONTROL — MINNESOTA RIVER CHASKA PROJECT CHASKA, MINNESOTA CHASKA STAGE 4 DRAINAGE & LEVEES LEVEE TYPICAL SECTIONS STA. 21+00 TO STA. 32+00</p>			
ED-0	CAD FILE NAME: MIN10TYP2.DWG	DRAWING NUMBER:	SHT 31
ED-0H	DATE: 07-20-92	M34-CH-R-64/230	OF 119



TYPICAL SECTION
STA. 32+00 TO STA. 35+70

5
64/223



TYPICAL SECTION
STA. 35+70 TO STA. 42+00

6
64/223
64/224

ES:

REFER TO INTERCEPTOR PIPE PROFILE SHEETS FOR SIDE DITCH GRADES.
MINIMUM 6" STRIPPING ON LANDWARD SIDE OF EXISTING LEVEE BEGINNING
AT STA. 34+50.
REFER TO PLAN & PROFILE SHEETS FOR EXTENT OF BERMS AND TRENCH.
AREA NORTH OF INTERCEPTOR PIPE TO WORK LIMITS WILL BE SOD, STA.
37+00 TO STA. 71+00.

REFERENCES:

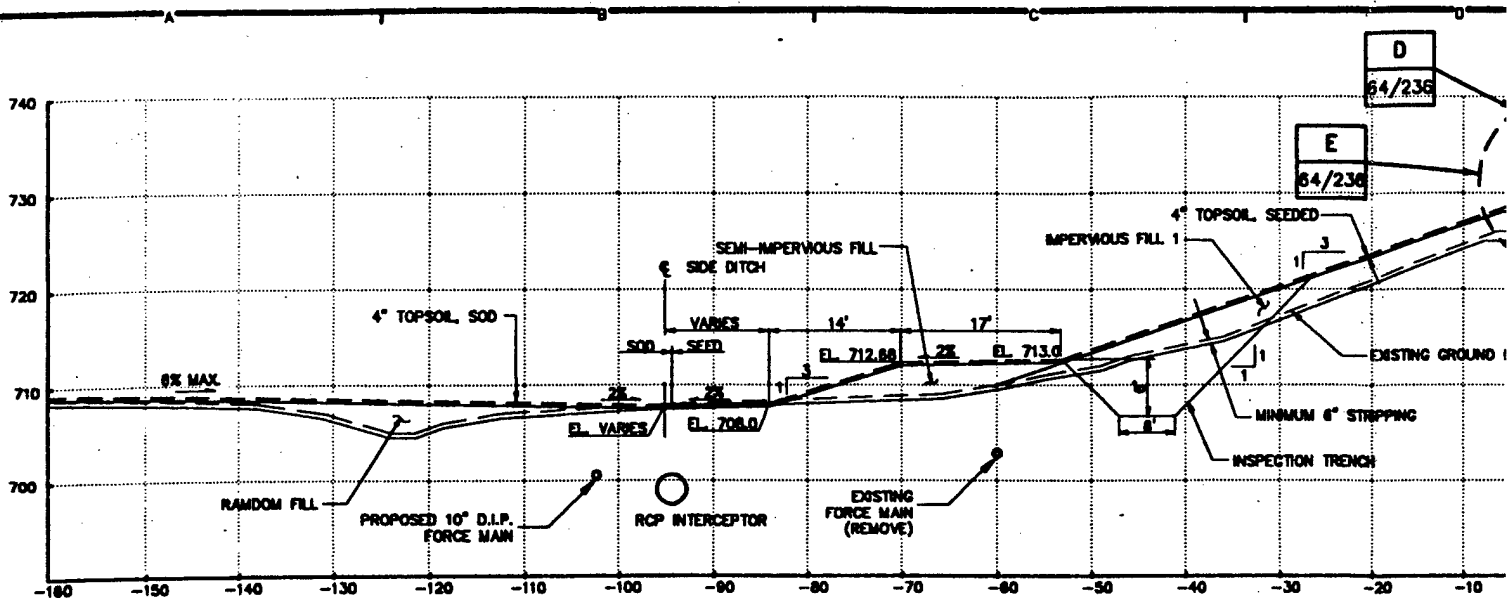
TEMPORARY EROSION CONTROL DETAILS ——— 64/237
EAST INTERCEPTOR PIPE ——— 64/255

DWG. NO.

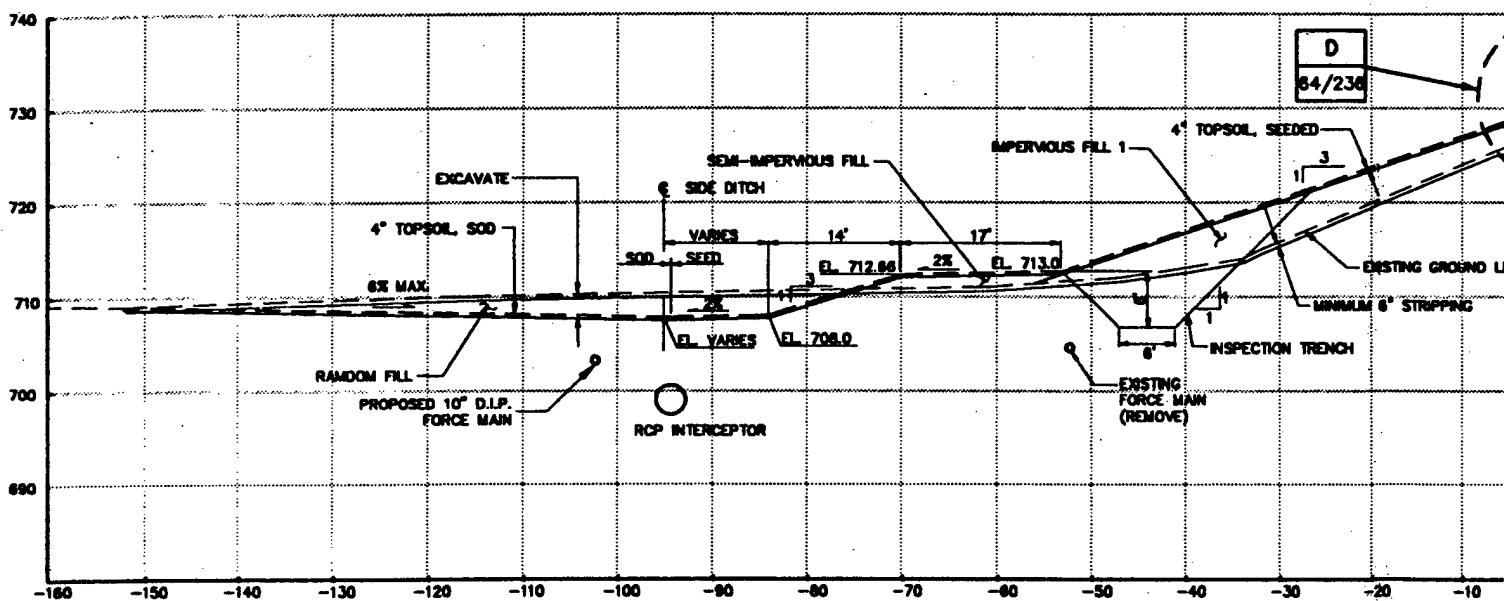


FIGURE 25

SYMBOL	DESCRIPTION	DATE
B R W	PLANNING TRANSPORTATION ENGINEERING URBAN DESIGN	
DESIGNED: TJS	DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA	
DRAWN: HNR		
CHECKED: TJS		
SUBMITTED BY:		
ED-0	FLOOD CONTROL — MINNESOTA RIVER CHASKA PROJECT CHASKA, MINNE CHASKA STAGE 4 DRAINAGE & LEVEES LEVEE TYPICAL SECTIONS STA. 32+00 TO STA. 42+00	
ED-0H	CAD FILE NAME: MN10TYP3.DWG	DRAWING NUMBER:
DATE: 07-29-92	SPEC NO:	M34-CH-R-64/231



TYPICAL SECT
STA 42+00 TO ST.
STA 57+75 TO ST.



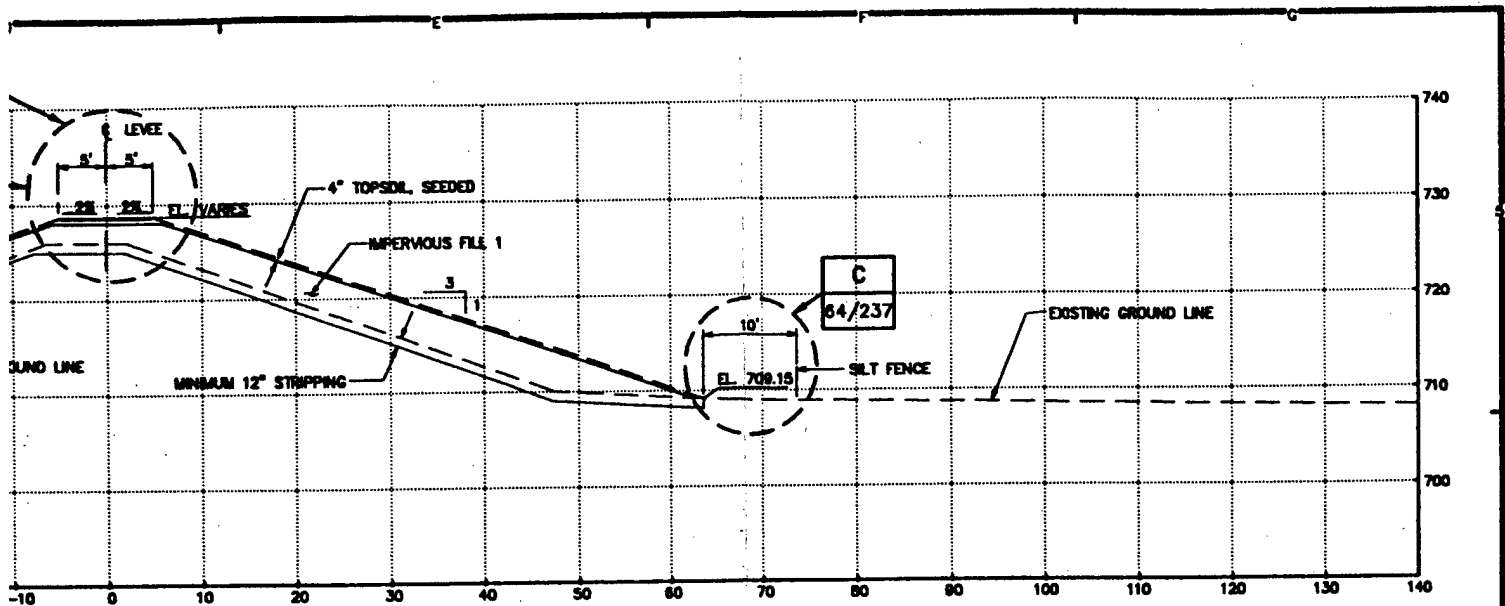
TYPICAL SECT
STA 45+00 TO ST.

NOTES:

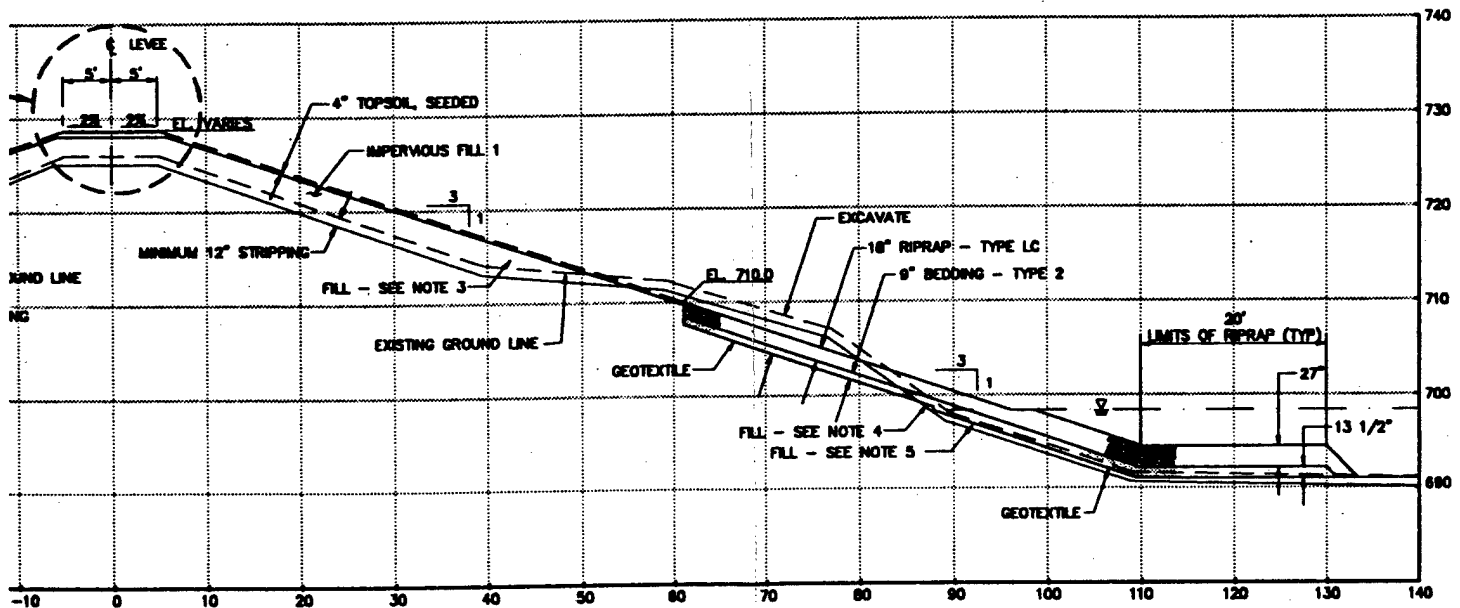
1. BEGIN DETAIL E TYPICAL LEVEL
2. MINIMUM 6" STRIPPING ON LAI
3. FILL ABOVE EL. 705 SHALL BE
4. FILL BELOW EL. 705 AND ABOVE
5. FILL BELOW EL. 705 AND BELOW
6. 18" RIPRAP AND 9" BEDDING
7. WATER ELEVATION SHOWN FOR
8. AREA NORTH OF INTERCEPTOR
- 37+00 TO STA. 71+00.

REFERENCES:

1. TEMPORARY EROSION CONTROL
2. EAST INTERCEPTOR PIPE
3. WEST INTERCEPTOR PIPE



SECTION	7
TO STA. 45+00	64/224
TO STA. 59+00	64/226



SECTION	8
TO STA. 52+00	64/224
	64/225

4. LEVEE SECTION AT STA. 53+00
ON LANDWARD SIDE OF EXISTING LEVEE.
ALL BE IMPERVIOUS MATERIAL.
D ABOVE THE WATER SHALL BE RANDOM OR PERVIOUS MATERIAL.
D BELOW THE WATER SHALL BE PERVIOUS MATERIAL.
EDDING THICKNESSES ARE INCREASED 50%, TO 27" AND 13 1/2"
DERWATER PLACEMENT.
MIN FOR MAY 7, 1992. ELEV. 697.3
ICEPIOR PIPE TO WORK LIMITS WILL BE 500, STA.
1.

DWG. NO.

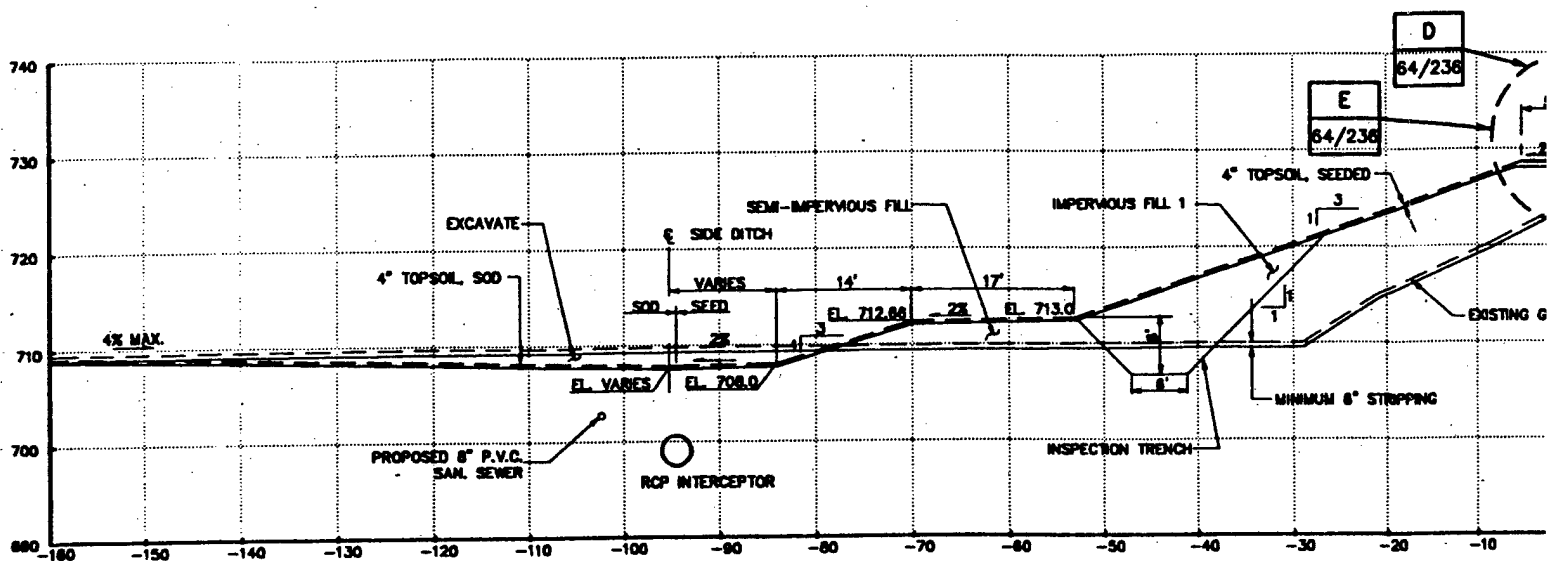
CONTROL DETAILS — — — — — 64/237
— — — — — 64/255
— — — — — 64/256



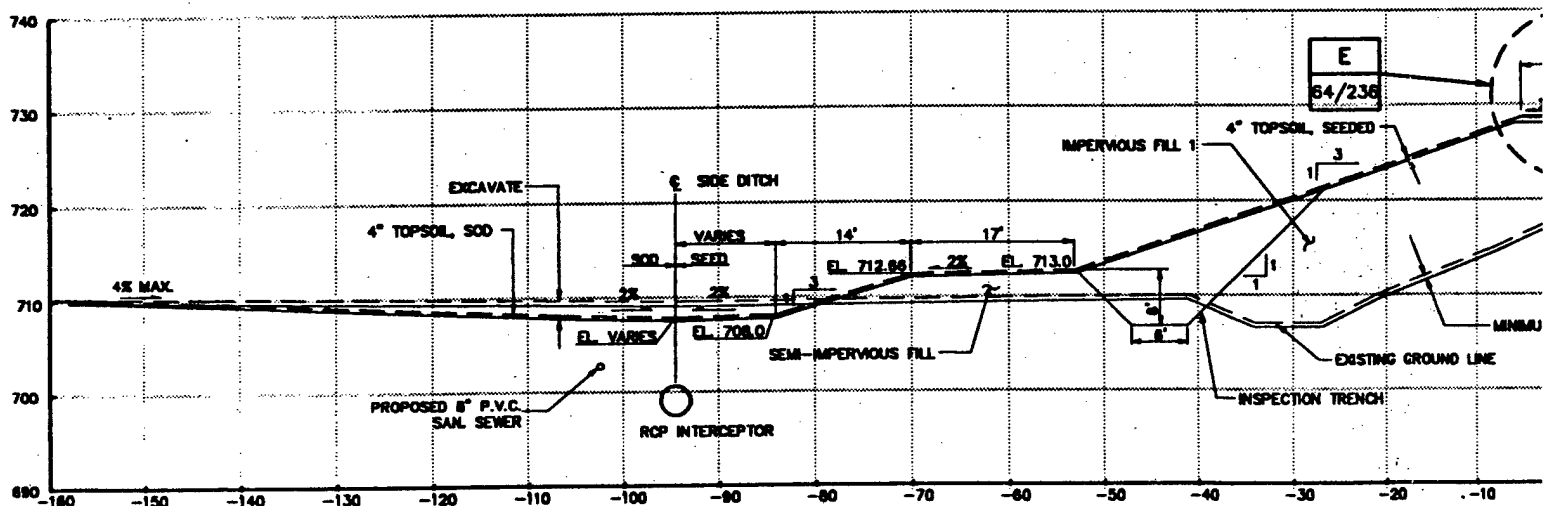
2

FIGURE 26

SYMBOL		DESCRIPTION		DATE	APPROVAL
B R W		FLOODING TRANSPORTATION ENGINEERING URBAN DESIGN			
DESIGNED: TJS DRAWING: MCR CHECKED: TJS SUBMITTED BY: ED-0 ED-0H DATE: 07-29-92					
DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA					
FLOOD CONTROL - MINNESOTA RIVER CHASKA PROJECT CHASKA, MINNESOTA CHASKA STAGE 4 DRAINAGE & LEVEES LEVEE TYPICAL SECTIONS STA. 42+00 TO STA. 52+00					
CAD FILE NAME: MN10TYP4.DWG				DRAWING NUMBER:	SHT 33
SPEC NO:				M34-CH-R-84/232	OF 119



TYPICAL SECTION
STA. 52+00 TO STA.



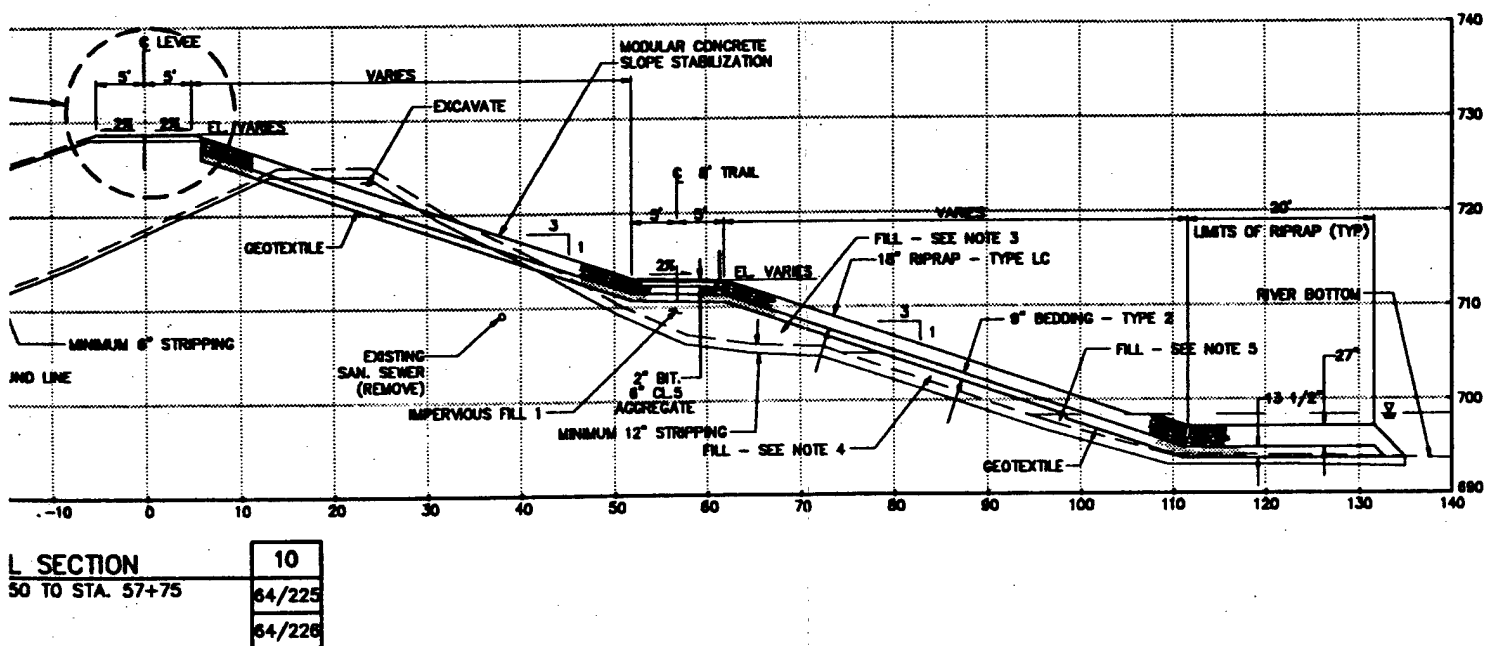
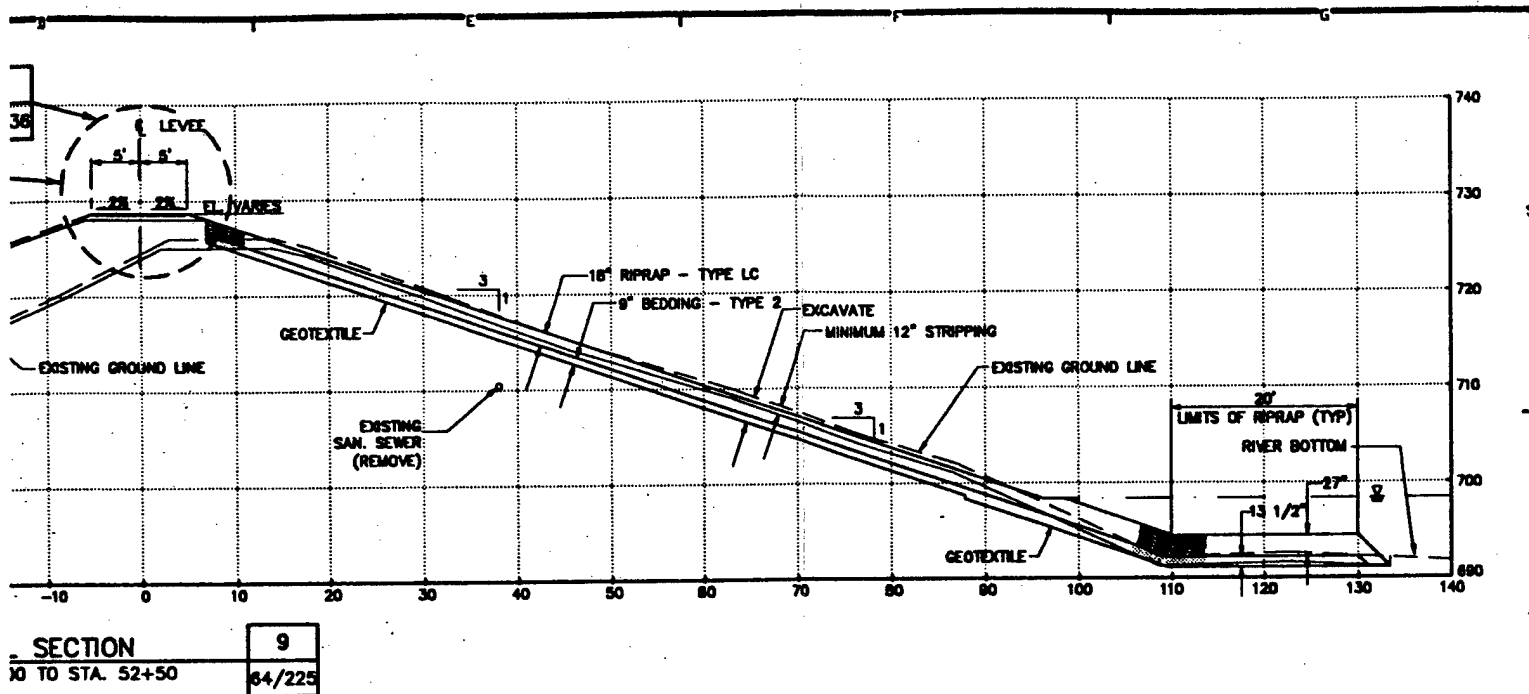
TYPICAL SECTION
STA. 52+50 TO STA.

NOTES:

1. PROVIDE 10' MINIMUM CLEARANCE
2. MINIMUM 6" STRIPPING ON LANDW.
3. FILL ABOVE EL.705 SHALL BE IMP
4. FILL BELOW EL.705 AND ABOVE TI
5. FILL BELOW EL.705 AND BELOW TI
6. 18" RIPRAP AND 9" BEDDING THIC
7. CHINK TOP OF RIPRAP LAYER BEN
8. WATER ELEVATION SHOWN FOR MA
9. AREA NORTH OF INTERCEPTOR PIF

REFERENCES:

1. WEST INTERCEPTOR PIPE
2. SAFETY RAIL



IN CLEARANCE UNDER U.S. 41 BRIDGE.
ING ON LANDWARD SIDE OF EXISTING LEVEE.
SHALL BE IMPERVIOUS MATERIAL.
AND ABOVE THE WATER SHALL BE RANDOM OR PERVIOUS MATERIAL.
AND BELOW THE WATER SHALL BE PERVIOUS MATERIAL.
BEDDING THICKNESSES ARE INCREASED 50% TO 27" AND 13 1/2"
UNDERWATER PLACEMENT.
TAP LAYER BENEATH PATH.
SHOWN FOR MAY 7, 1992, ELEV. 698.3
INTERCEPTOR PIPE TO WORK LIMITS WILL BE S00, STA.
+00.

DWG. NO.

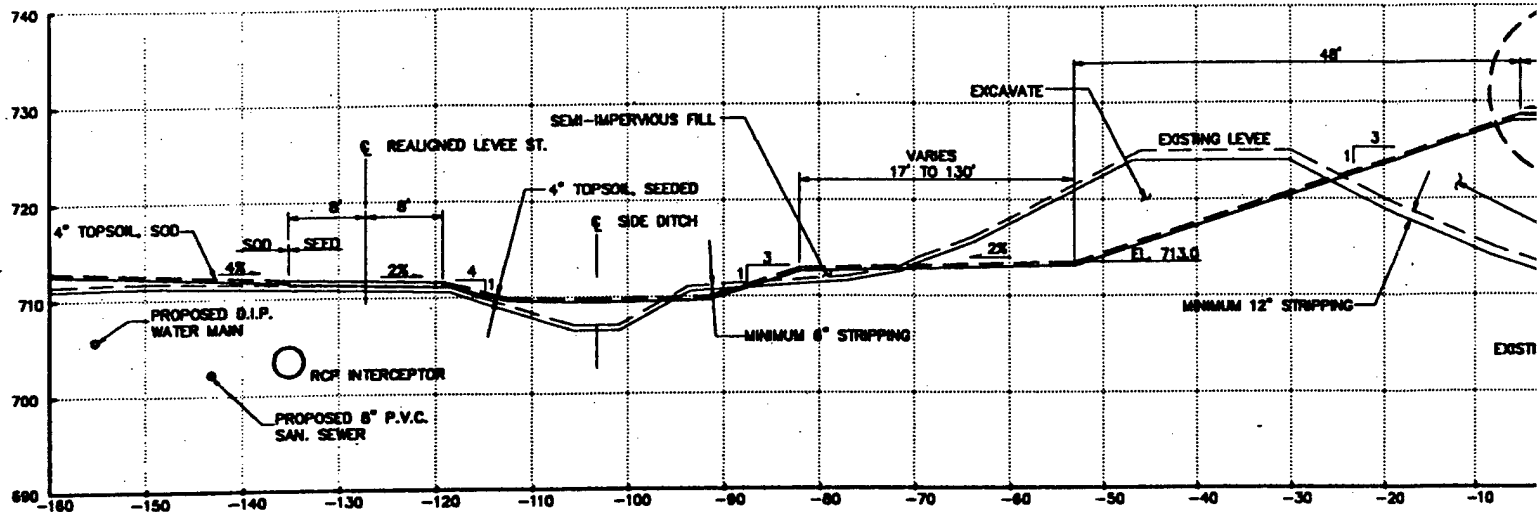
R. PIPE --- 64/256
--- 64/307



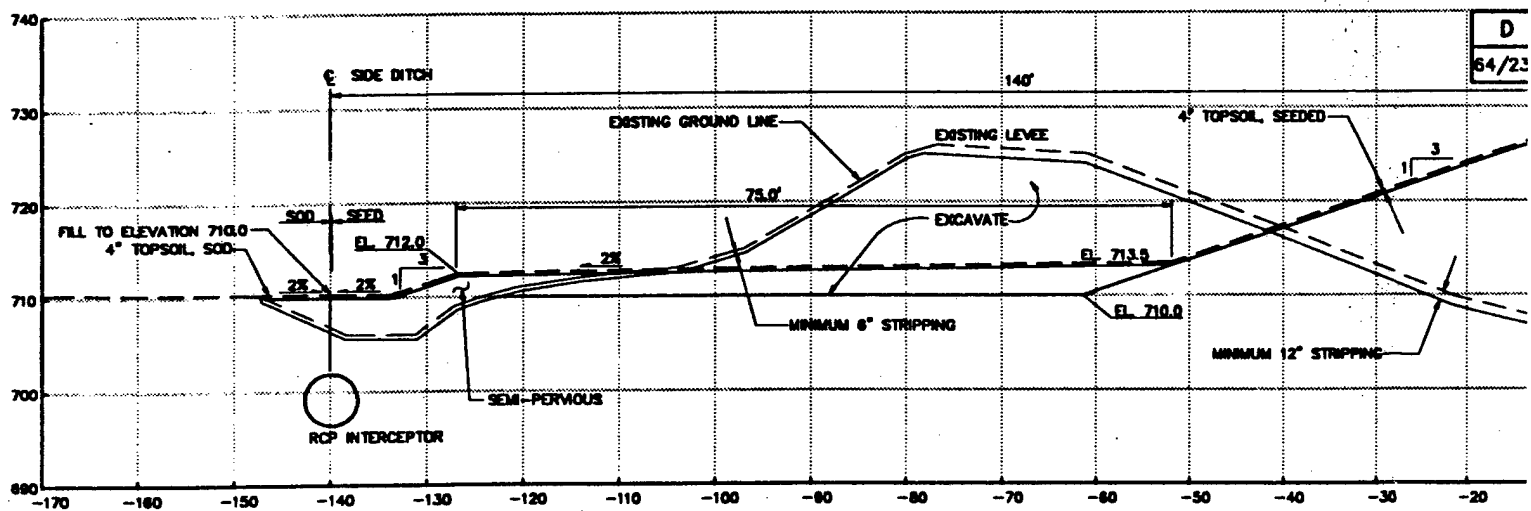
2

FIGURE 27

SYMBOL	DESCRIPTION	DATE	APPROVAL
<p>BRW PLANNING TRANSPORTATION ENGINEERING URBAN DESIGN</p> <p>DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA</p> <p>FLOOD CONTROL - MINNESOTA RIVER CHASKA PROJECT CHASKA, MINNESOTA CHASKA STAGE 4 DRAINAGE & LEVEES LEVEE TYPICAL SECTIONS STA. 52+00 TO STA. 57+75</p>			
DESIGNED: TJS	CAD FILE NAME: MN10TYP5.DWG	DRAWING NUMBER: M34-CH-R-64/233	SHT 34 OF 119
DRAWN: IKR	DATE: 07-29-92	SPEC NO:	
CHECKED: TJS			
SUBMITTED BY:			
ED-0			
ED-0H			



TYPICAL SECTION
STA. 59+00 TO STA.



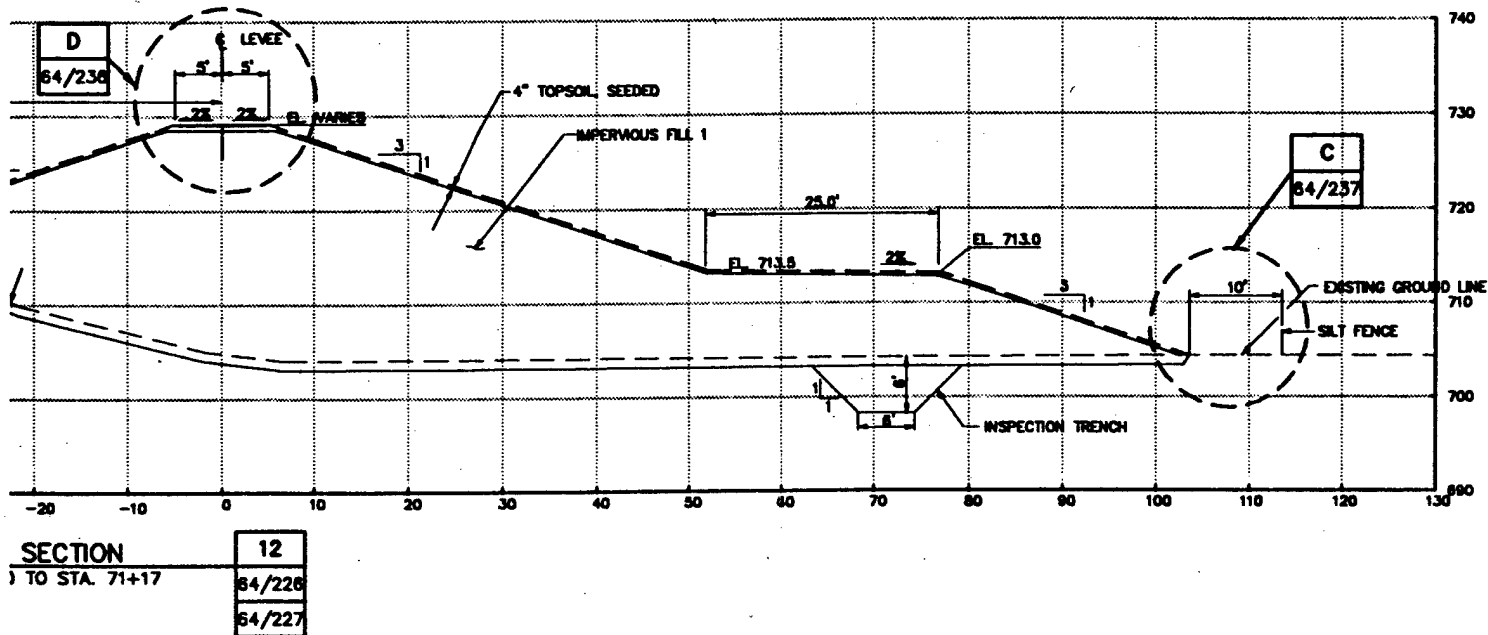
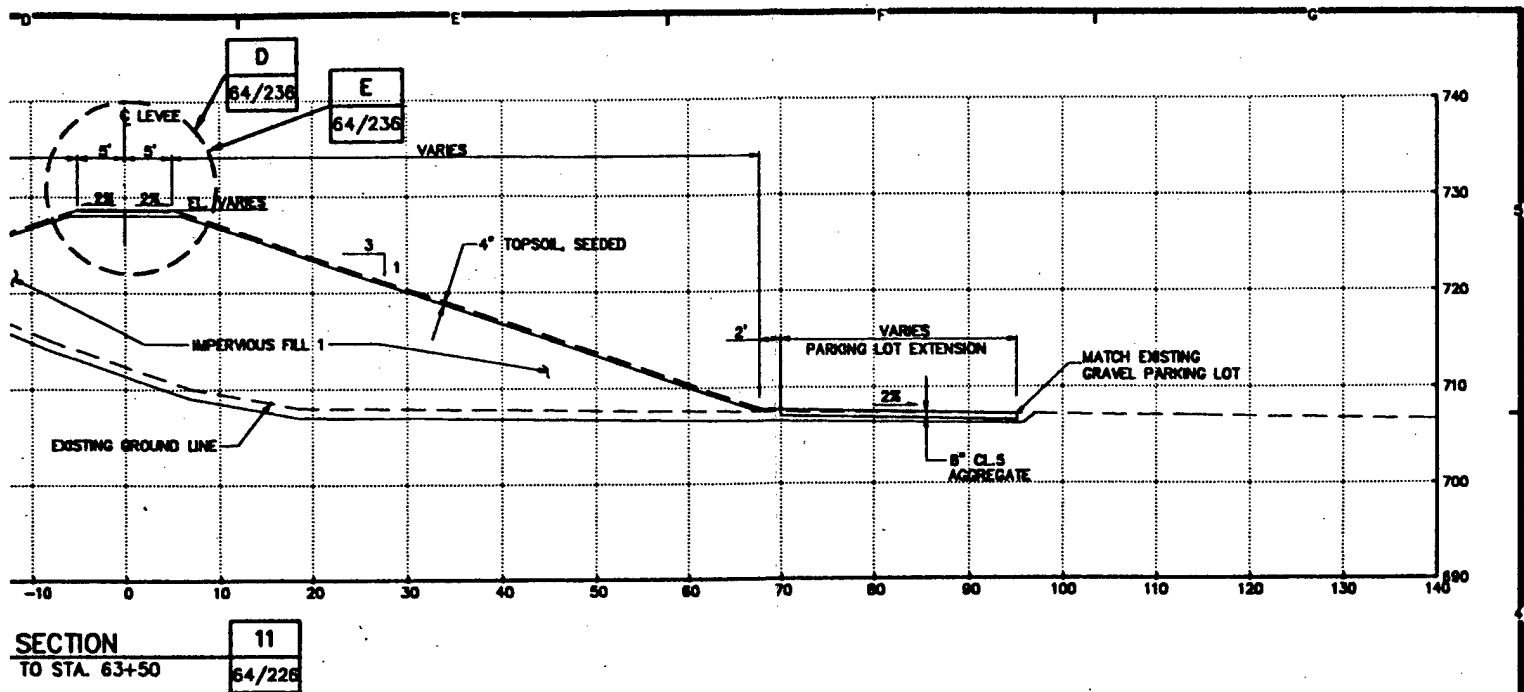
TYPICAL SECTION
STA. 63+50 TO STA.

NOTES:

1. END DETAIL D TYPICAL LEVEE SE
2. MINIMUM 6\"/>

REFERENCES:

1. TEMPORARY EROSION CONTROL C
2. WEST INTERCEPTOR PIPE



1. LEVEE SECTION AT STA. 62+57
2. ON LANDWARD SIDE OF EXISTING LEVEE.
3. RECEPTOR PIPE TO WORK LIMITS WILL BE 500, STA. 62+57.

DWG. NO.

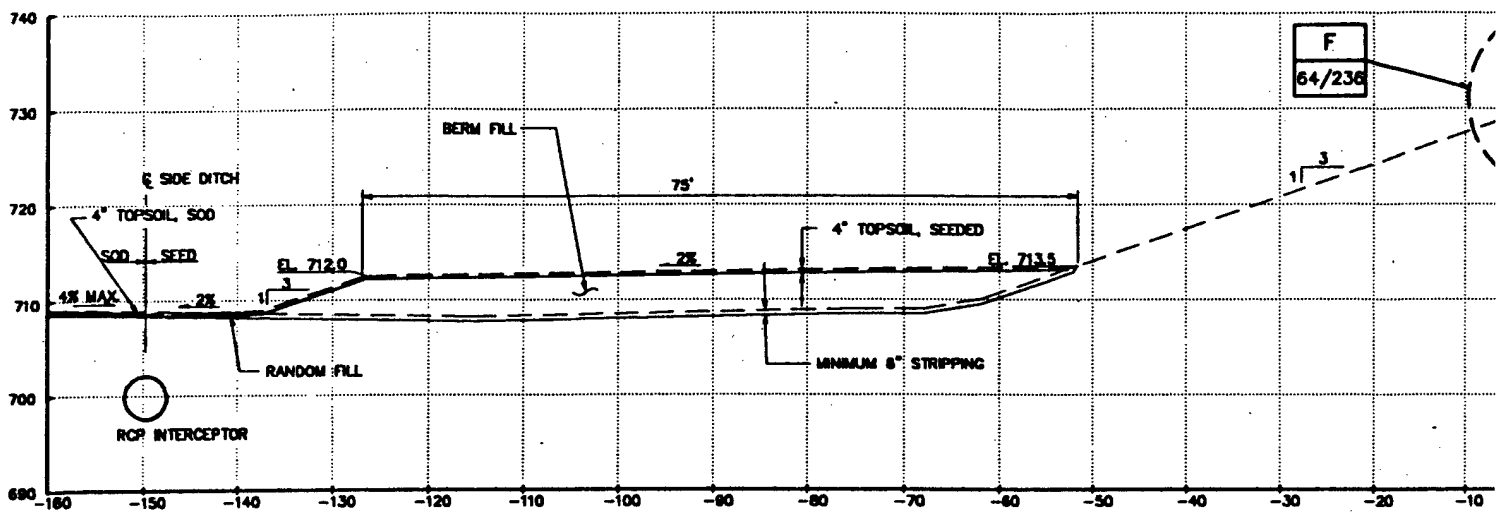
CONTROL DETAILS ——— 64/237
PIPE ——— 64/256



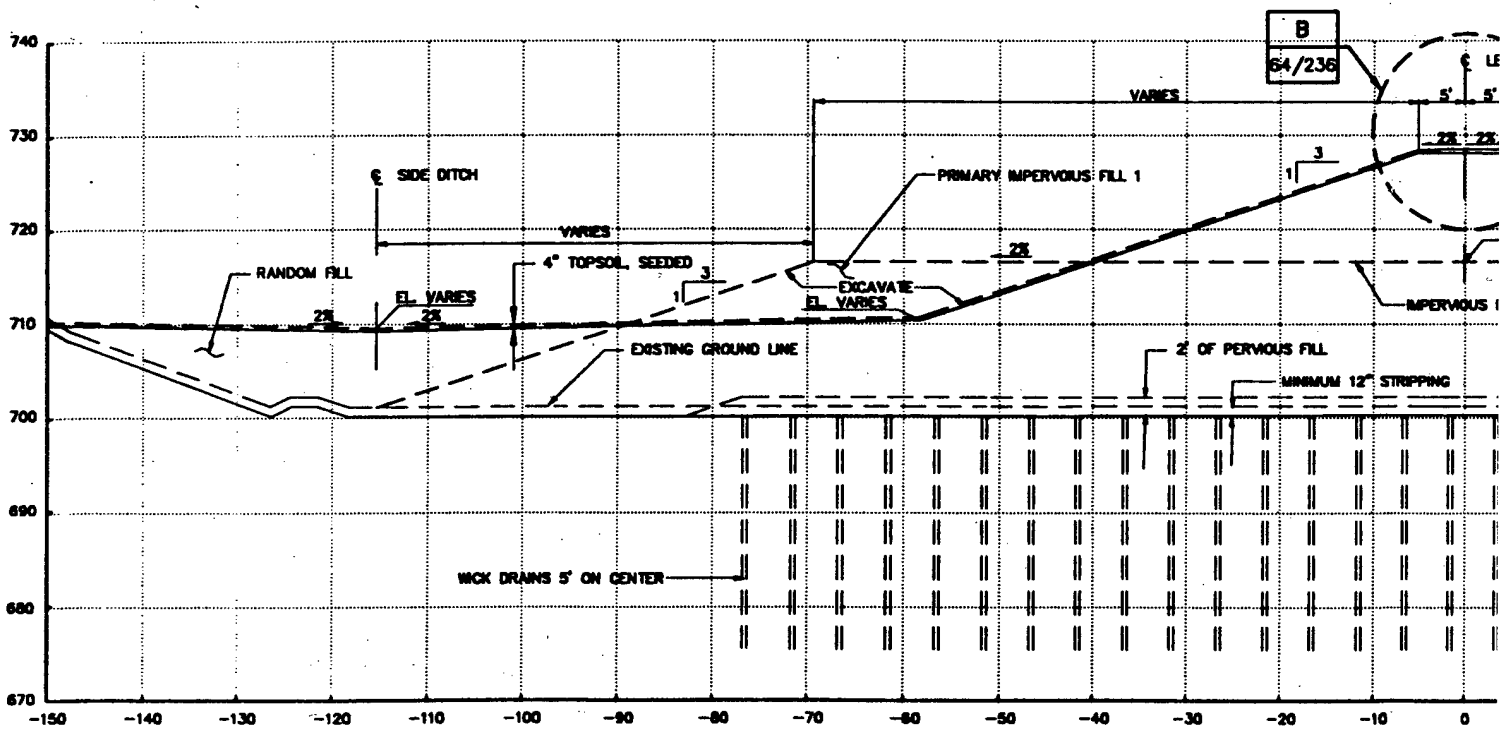
2

FIGURE 28

SYMBOL		DESCRIPTION		DATE	APPROVAL
BRW		PLANNING TRANSPORTATION ENGINEERING URBAN DESIGN			
DESIGNED: TJS		DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA			
DRAWN: IKR		FLOOD CONTROL - MINNESOTA RIVER CHASKA PROJECT CHASKA, MINNESOTA			
CHECKED: TJS		CHASKA STAGE 4 DRAINAGE & LEVEES			
SUBMITTED BY:		LEVEE TYPICAL SECTIONS STA. 57+75 TO STA. 71+17			
ED-0		CAD FILE NAME: MN10TYP6.DWG		DRAWING NUMBER	SHEET 35
ED-0H		SPEC NO.		M34-CH-R-64/234	OF 119
DATE: 07-29-92					



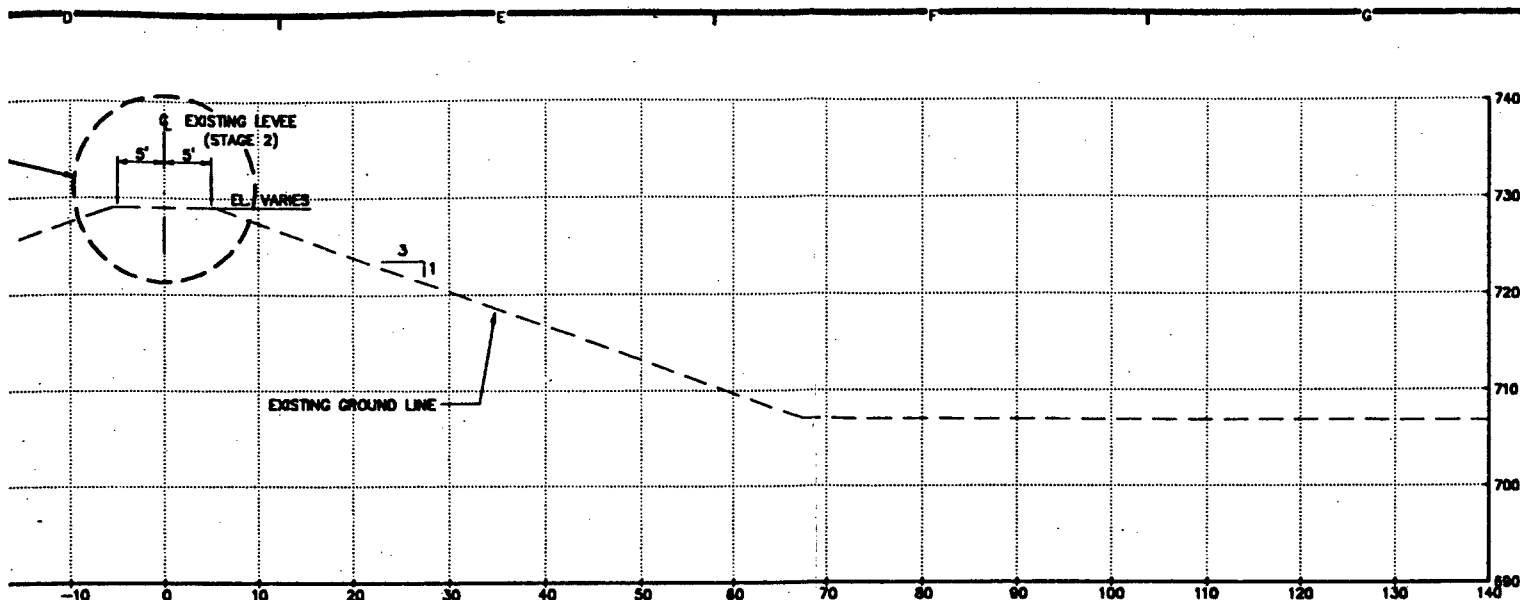
TYPICAL SECTION
STA. 71+17 TO STA. 78+80



TYPICAL SECTION
STA. 15+00 TO STA. 21+00

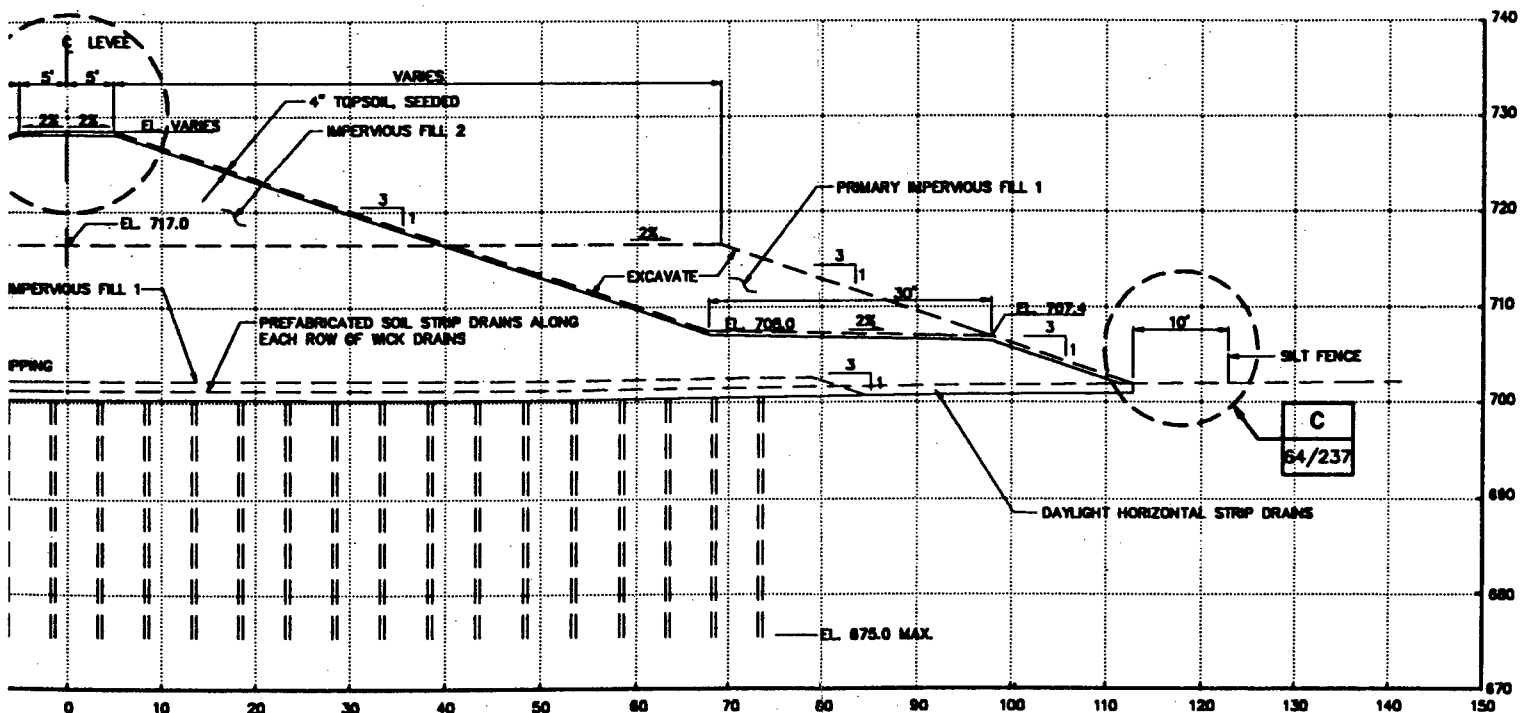
- NOTES:**
1. ADD 2" BITUMINOUS TO EXIS DONE HAULING: STA. 71+17
 2. AREA NORTH OF INTERCEPTOR 37+00 TO STA. 71+00.

- REFERENCES:**
1. WEST INTERCEPTOR PIPE



ION
L 78+60

13
64/227



ION
L 21+00

14
64/221
64/222

DUE TO EXISTING 6" AGGREGATE BASE AFTER TRUCKS ARE STA. 71+17 TO STA. 78+60. INTERCEPTOR PIPE TO WORK LIMITS WILL BE SOD, STA. 71+00.

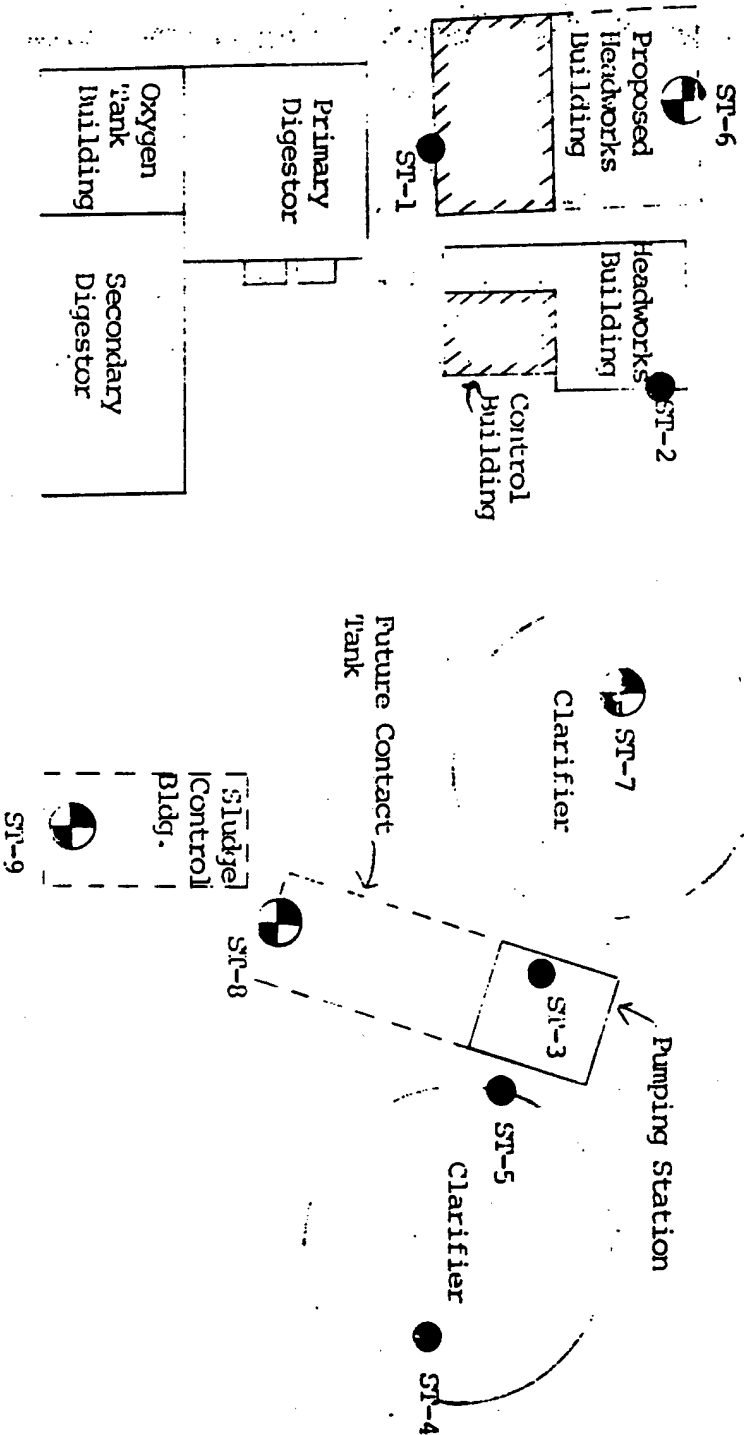
DWG. NO.

OR PIPE 64/256



FIGURE 29

SYMBOL	DESCRIPTION	DATE	APPROVAL
<div style="display: flex; justify-content: space-between;"> <div> <p>DESIGNED: TJS DRAWN: MKR CHECKED: TJS SUBMITTED BY: ED-0</p> </div> <div> <p>PLANNED TRANSPORTATION ENGINEERING URBAN DESIGN</p> <p>DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA</p> </div> </div>			
<p>FLOOD CONTROL - MINNESOTA RIVER CHASKA PROJECT CHASKA, MINNESOTA CHASKA STAGE 4 DRAINAGE & LEVEES LEVEE TYPICAL SECTIONS STA. 71+17 TO STA. 78+50</p>			
<p>CAD FILE NAME: MN10TYP7.DWG DATE: 07-29-92</p>		<p>DRAWING NUMBER: M34-CH-R-64/235 SHEET 36 OF 119</p>	



- Represents location of borings taken in 1974 and 1978
- ◐ Represents location of recent standard penetration test boring.

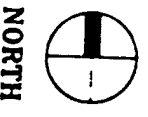
FIGURE 30

85-082 FOUNDATION INVESTIGATION
Proposed Chaska Treatment Plant Expansion
Chaska, Minnesota

BRAUN

Date: 3/27/85
Revised: -
Drawn: BMB/RAH
Scale: 1"=40'

SOIL BORING LOCATIONS



- LEGEND**
- ◆ BORING LOCATION
 - ◆ PROPOSED BORING
 - ◆ NOT PERFORMED

CARVER COUNTY GOVERNMENT CENTER

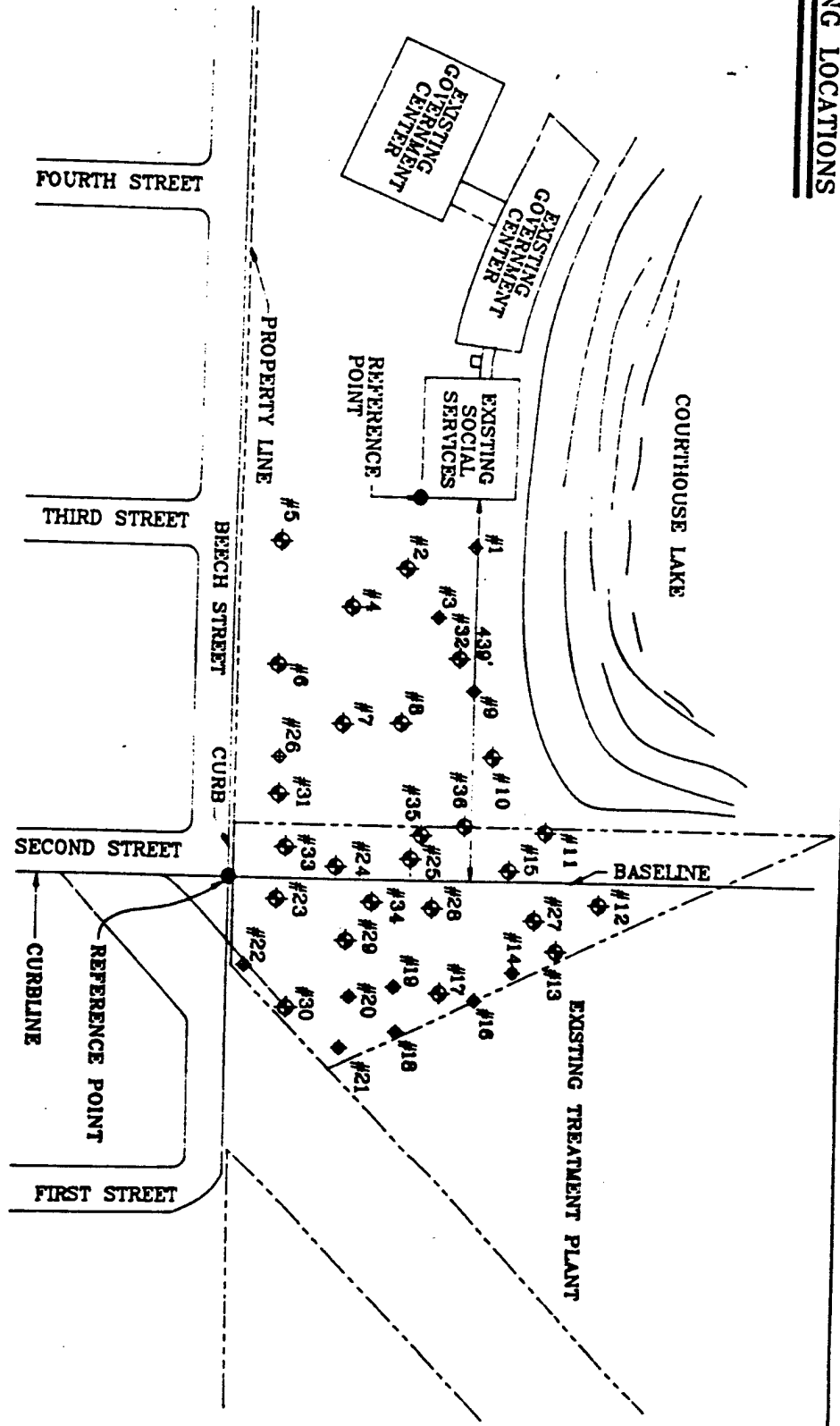
CHASKA, MINNESOTA

SCALE: 1"=120'

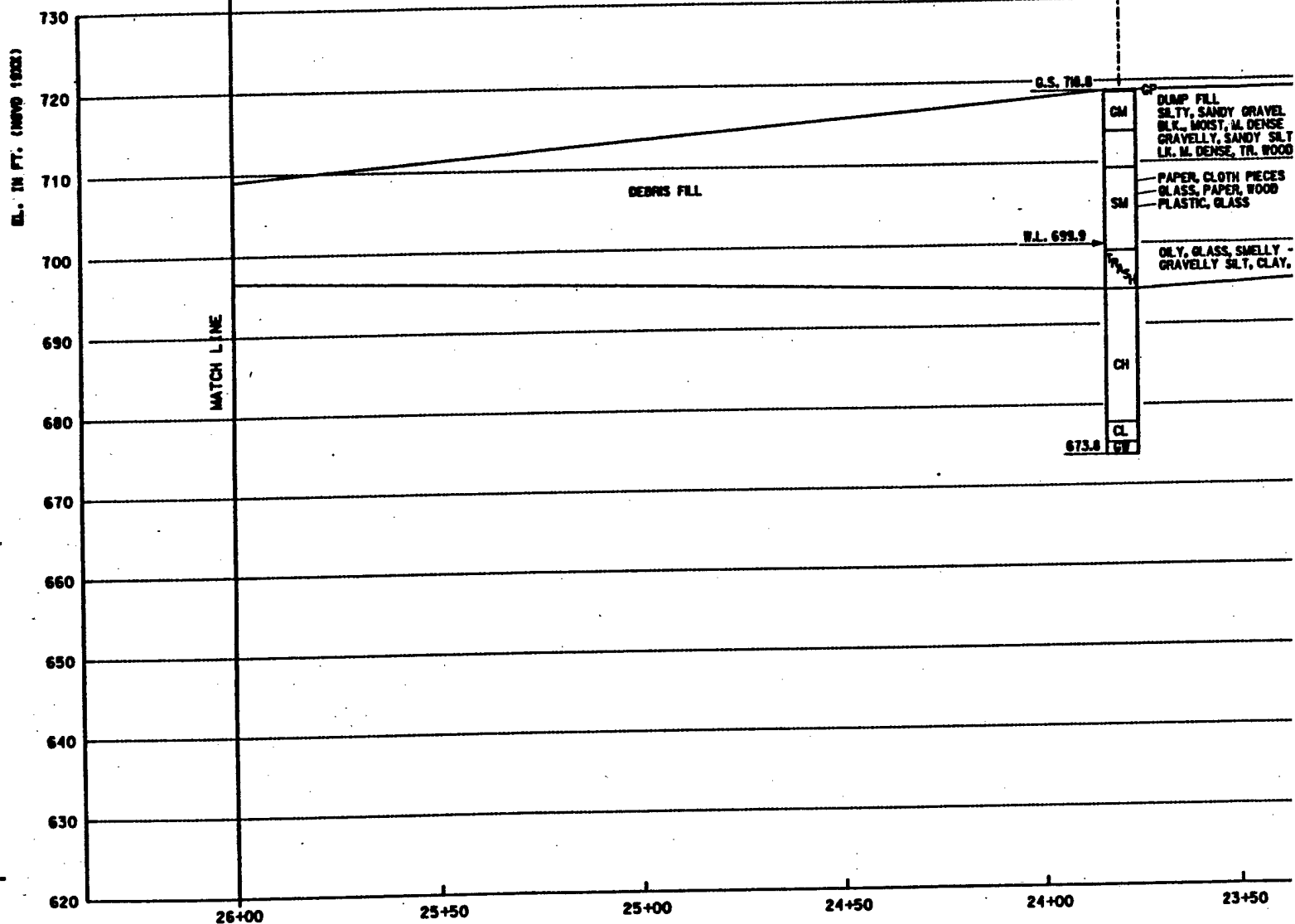
(APPROXIMATELY)

JOB NO. 4220 89-1312

Figure 31



23+80
82-51M
16-18 OCT 1982



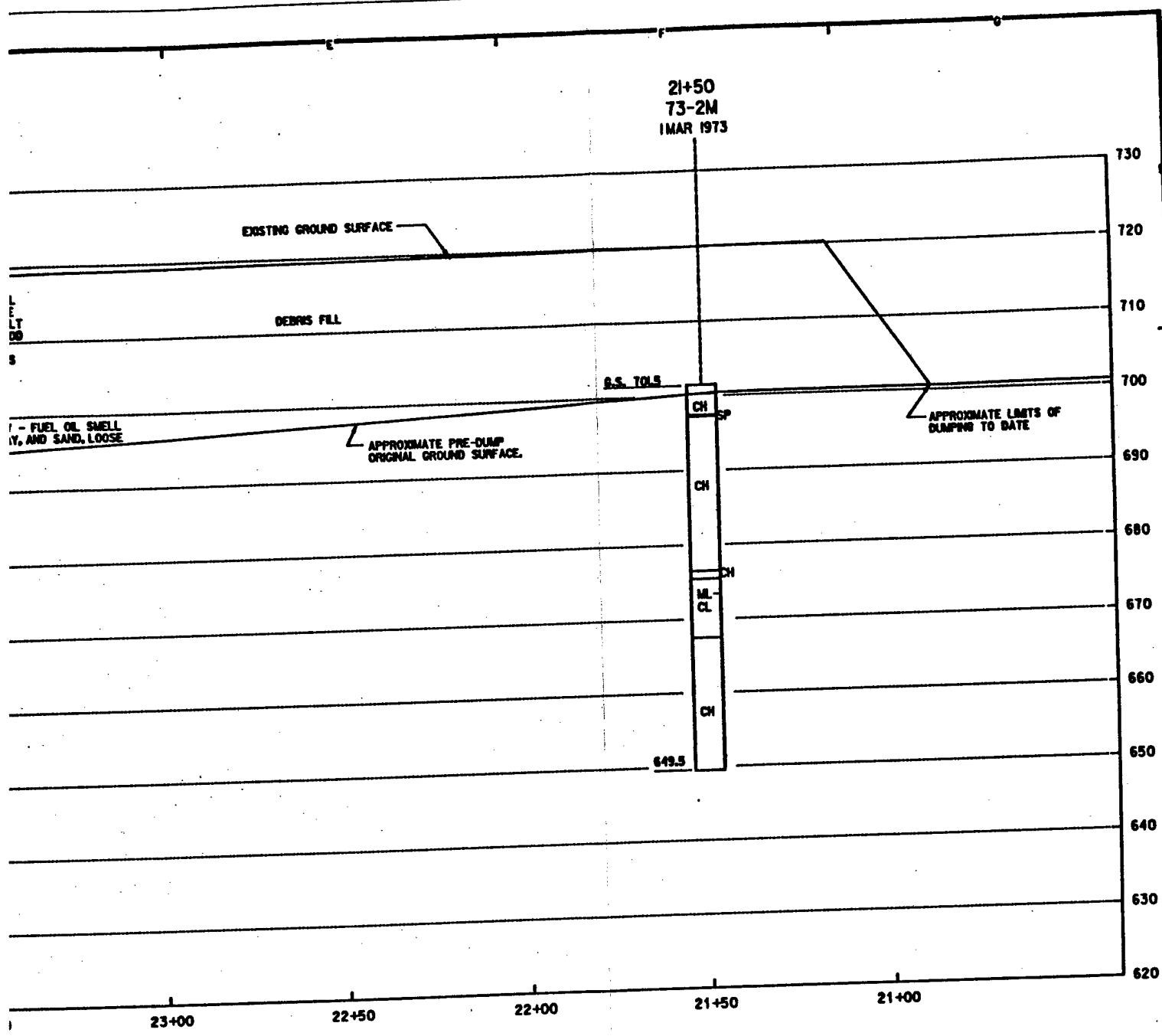
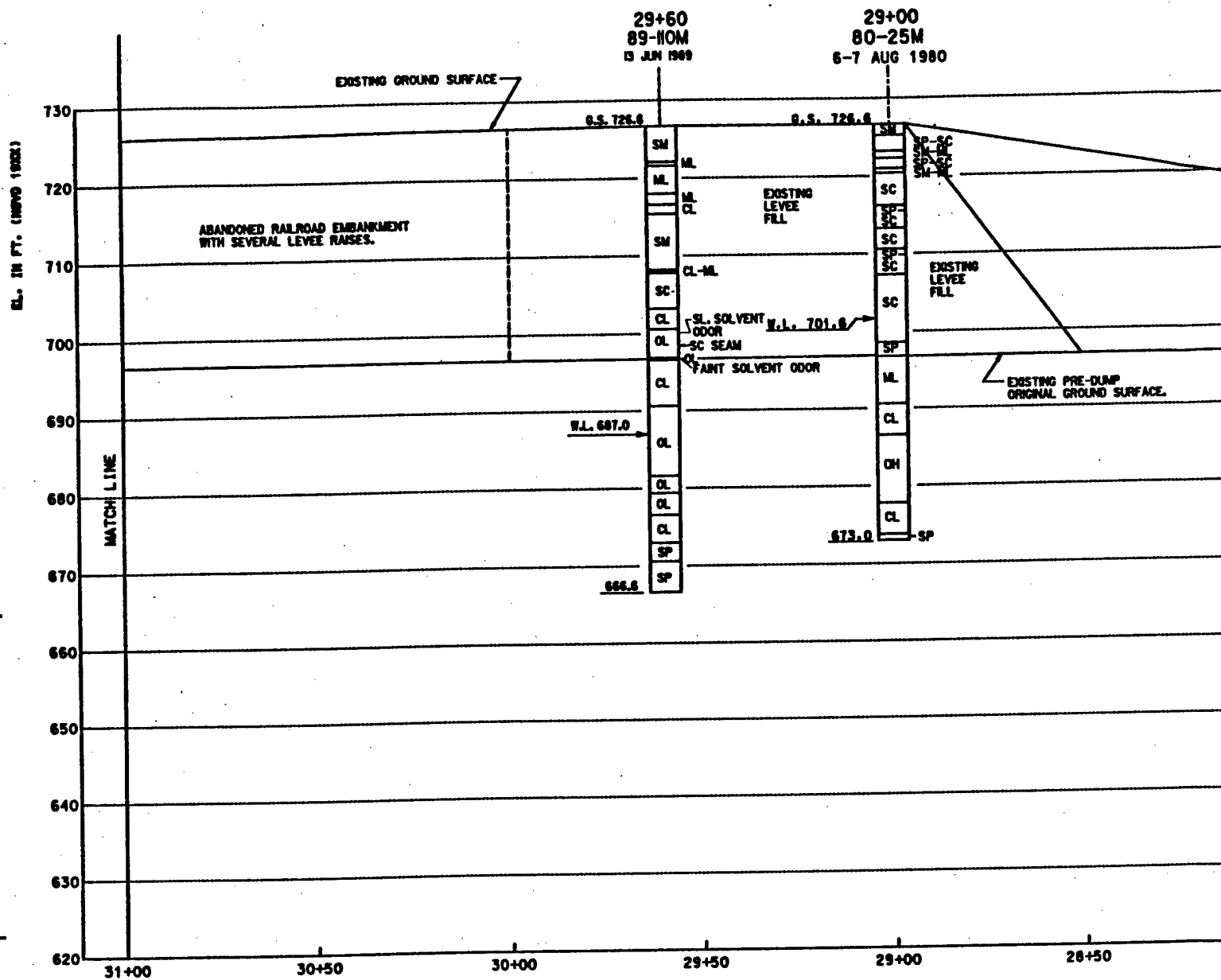


FIGURE 32



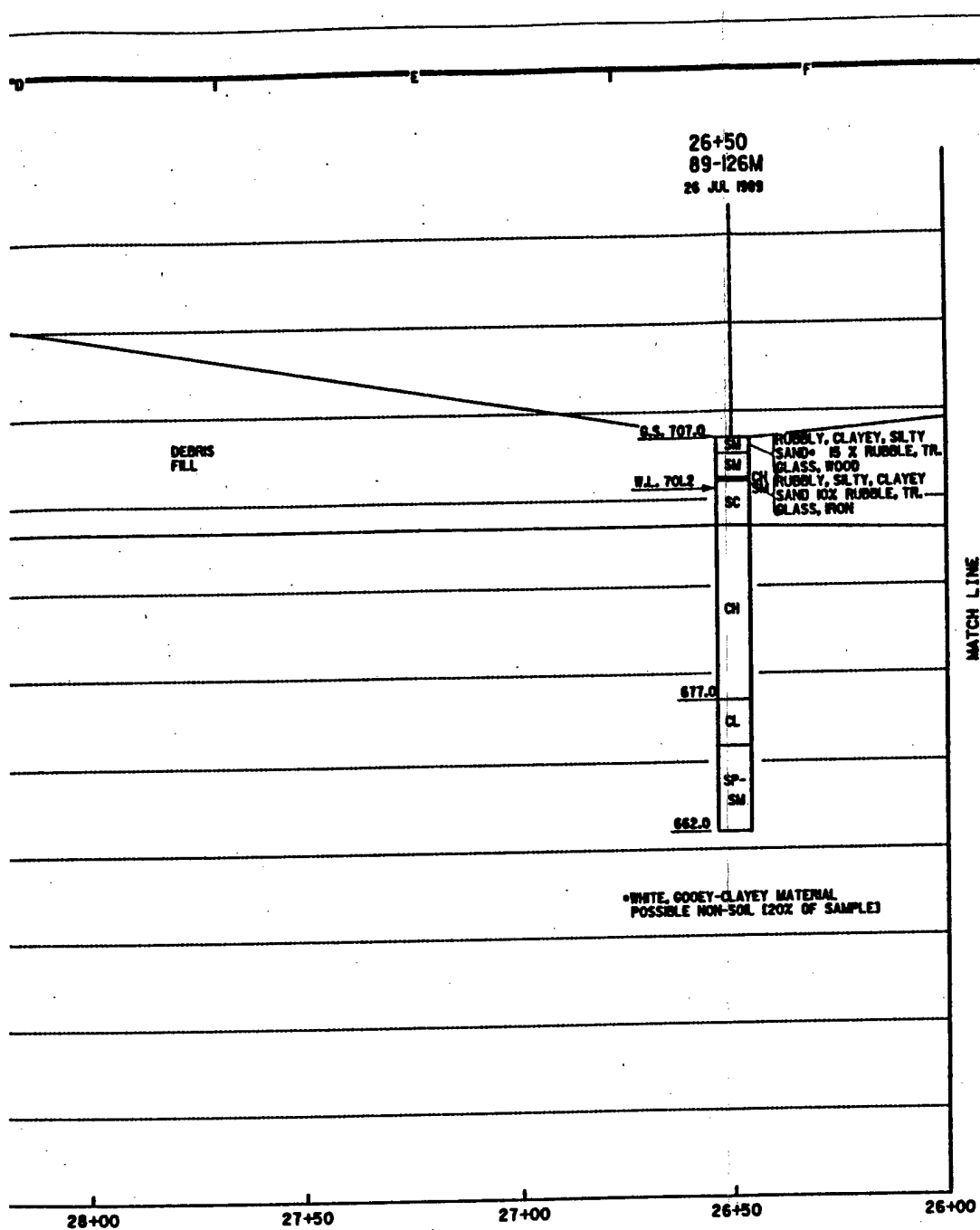
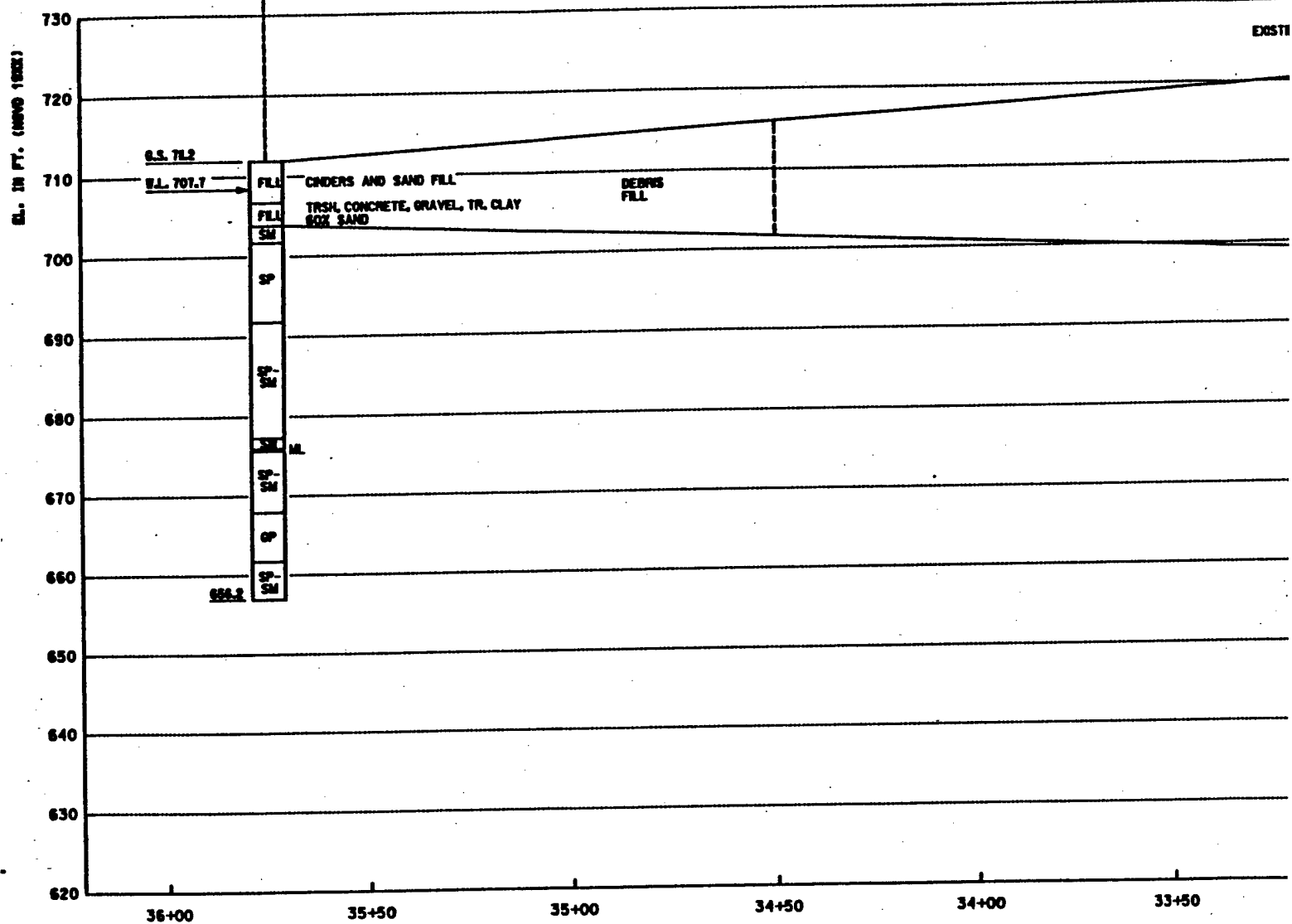


FIGURE 33

35+75
79-12M
4 MAY 1979



31+60
89-106M
26-27 MAY 1989

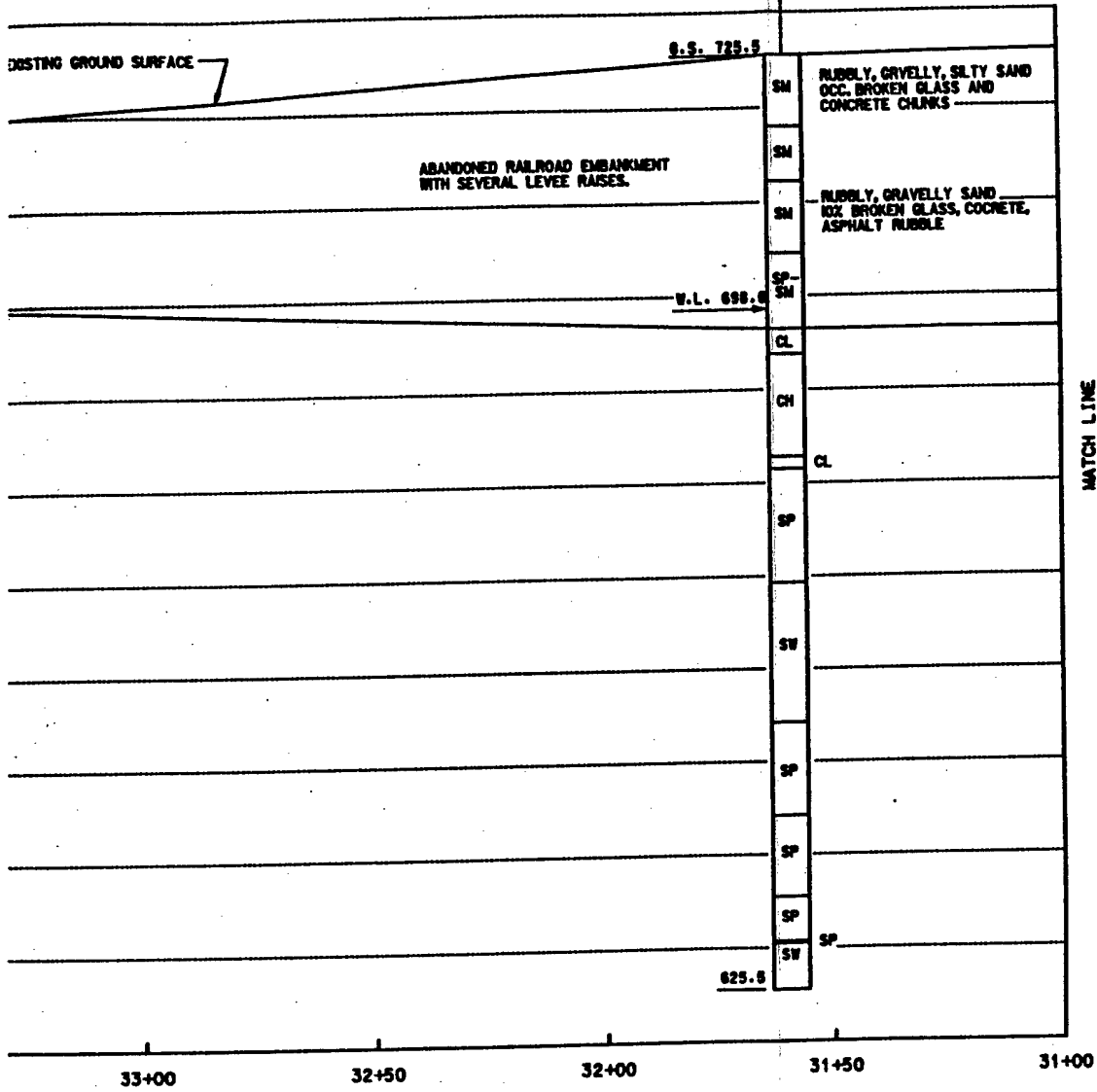
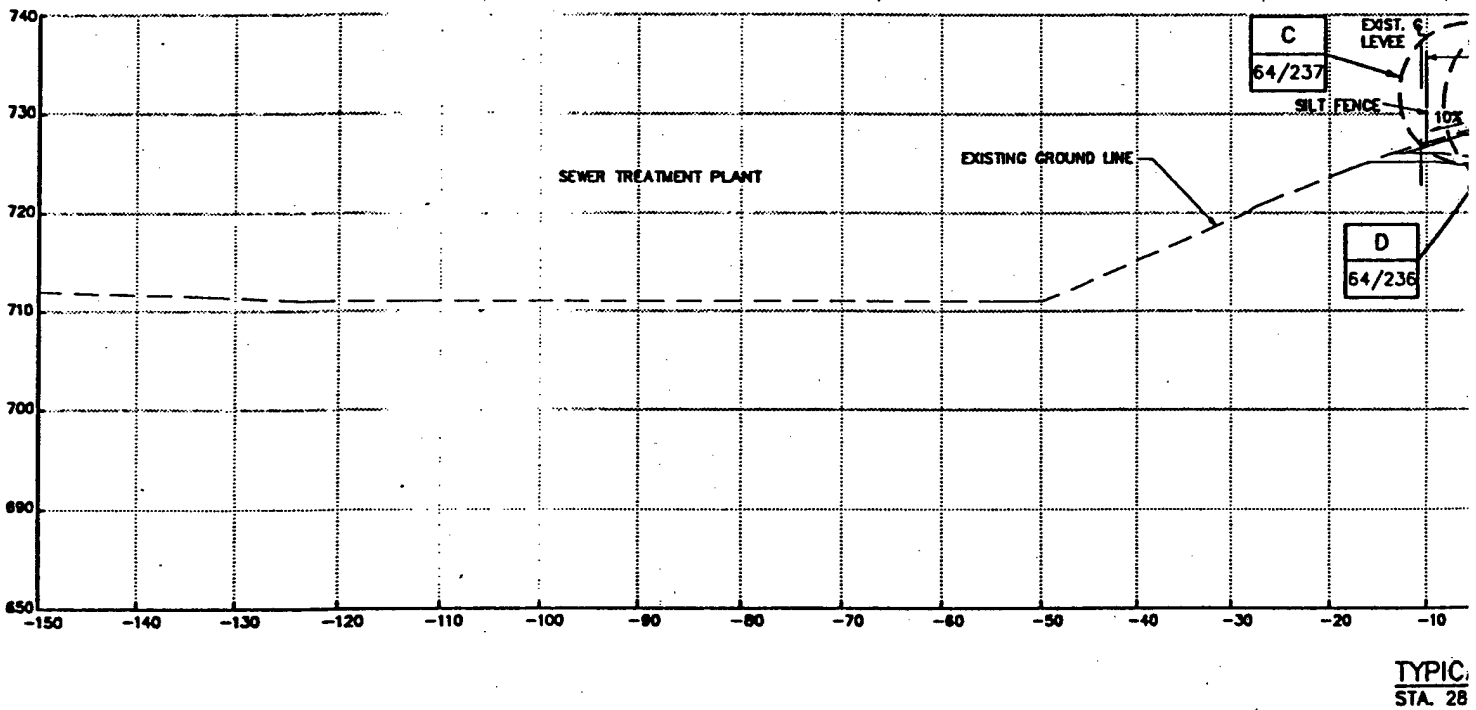
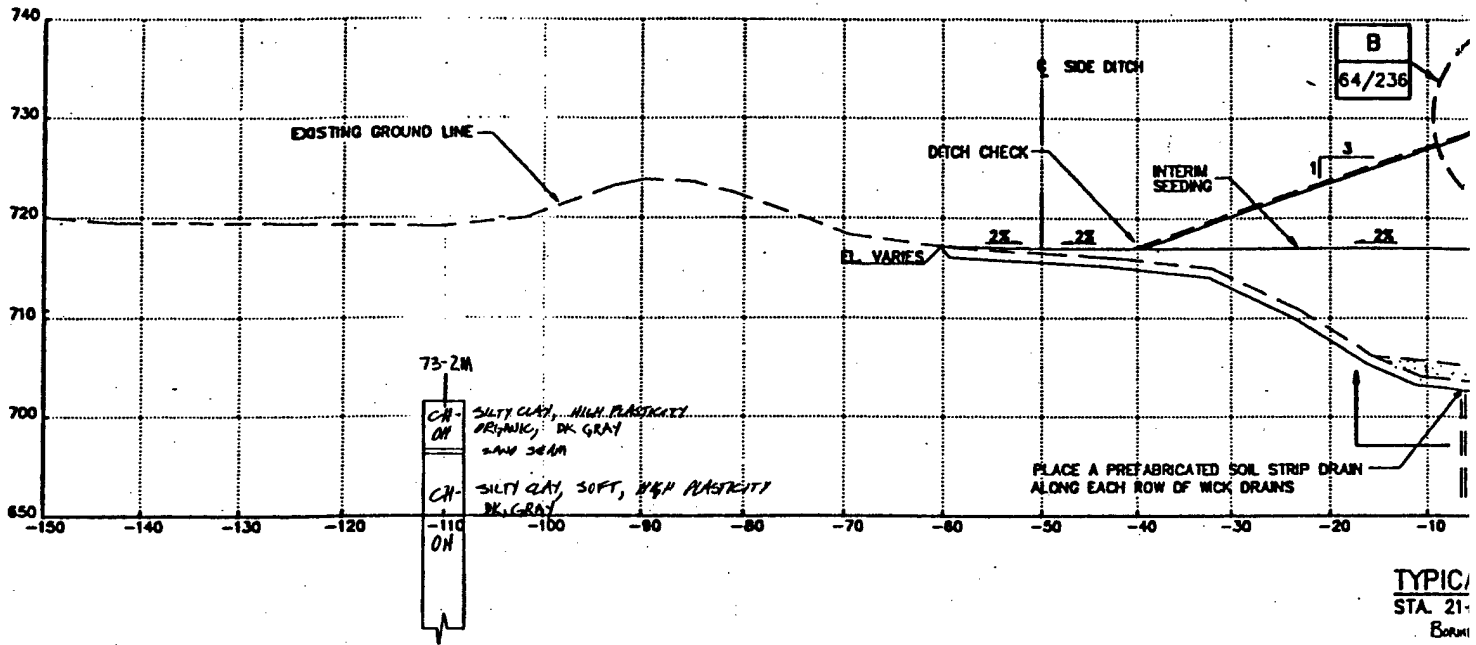


FIGURE 34

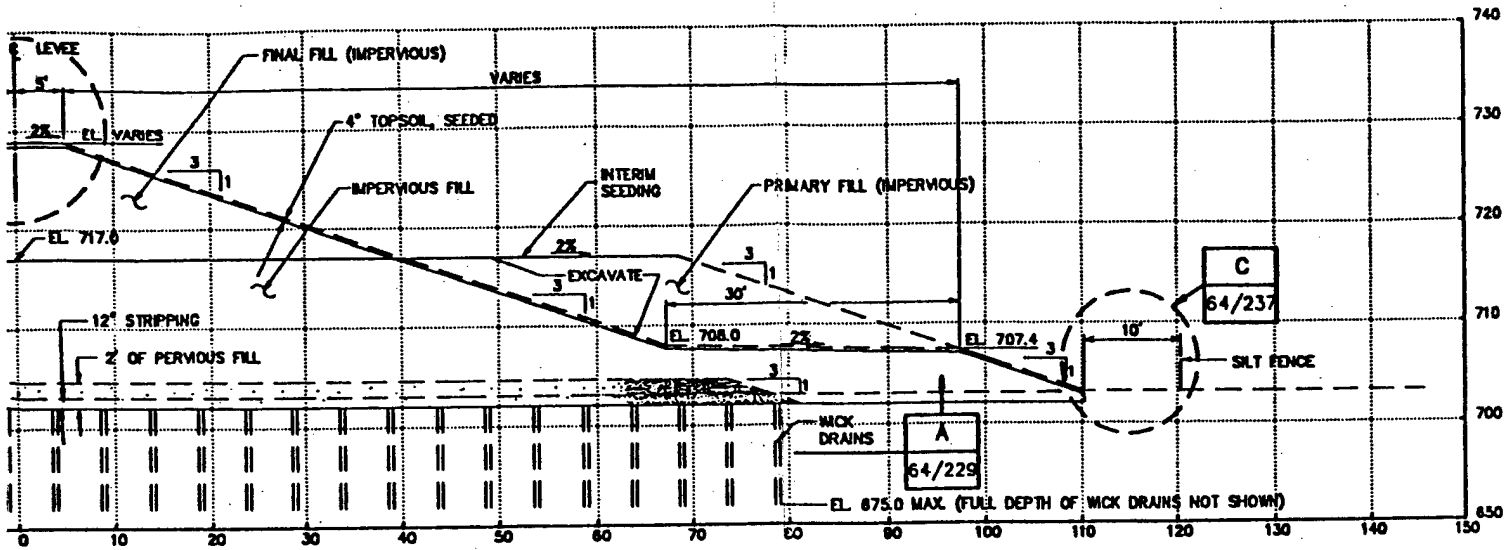


NOTES:

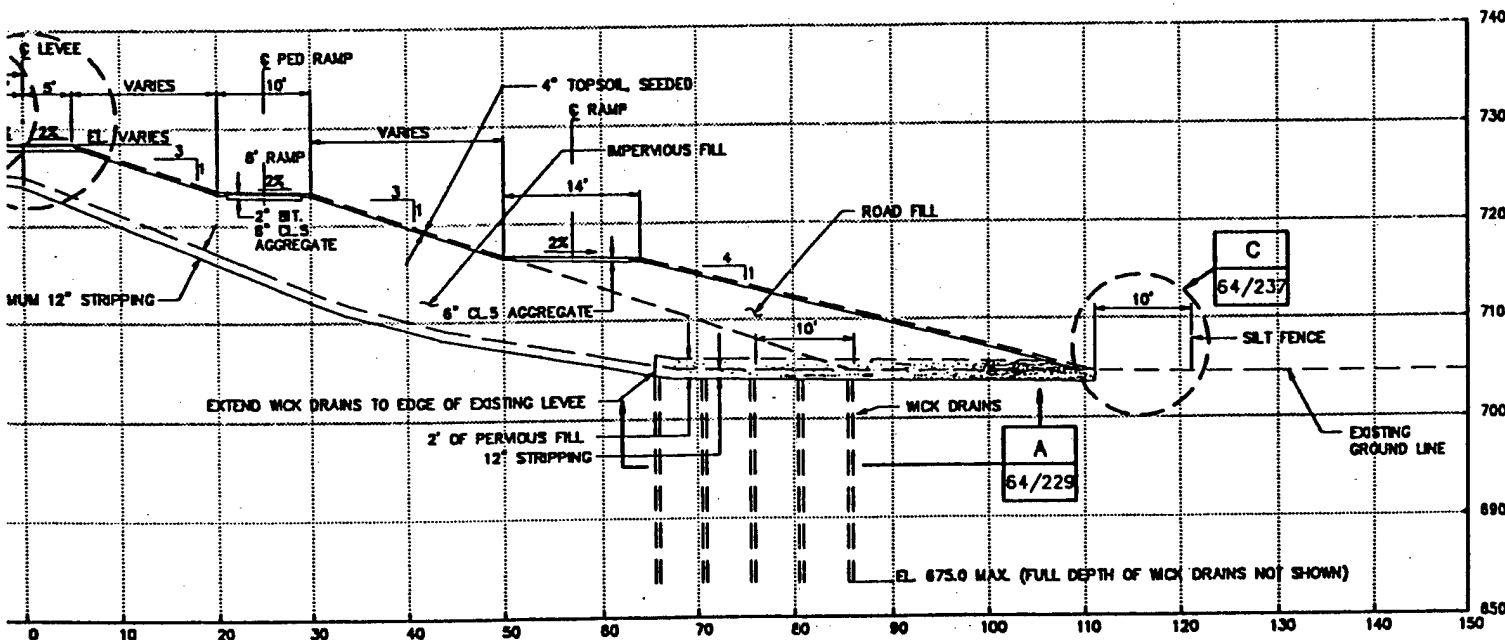
1. 8' PATH TIES INT
2. PLACE TEMPORAR LEVEE TO PROTEC

REFERENCES:

1. TEMPORARY EROS



SECTION 3
TO STA. 28+85
2A @ 21+50



SECTION 4
TO STA. 32+00

EXISTING BRIDGE AT STA. 30+25±
SILT FENCE AT THE TOP OF EXISTING
EVER TREATMENT PLANT.

DWG. NO.

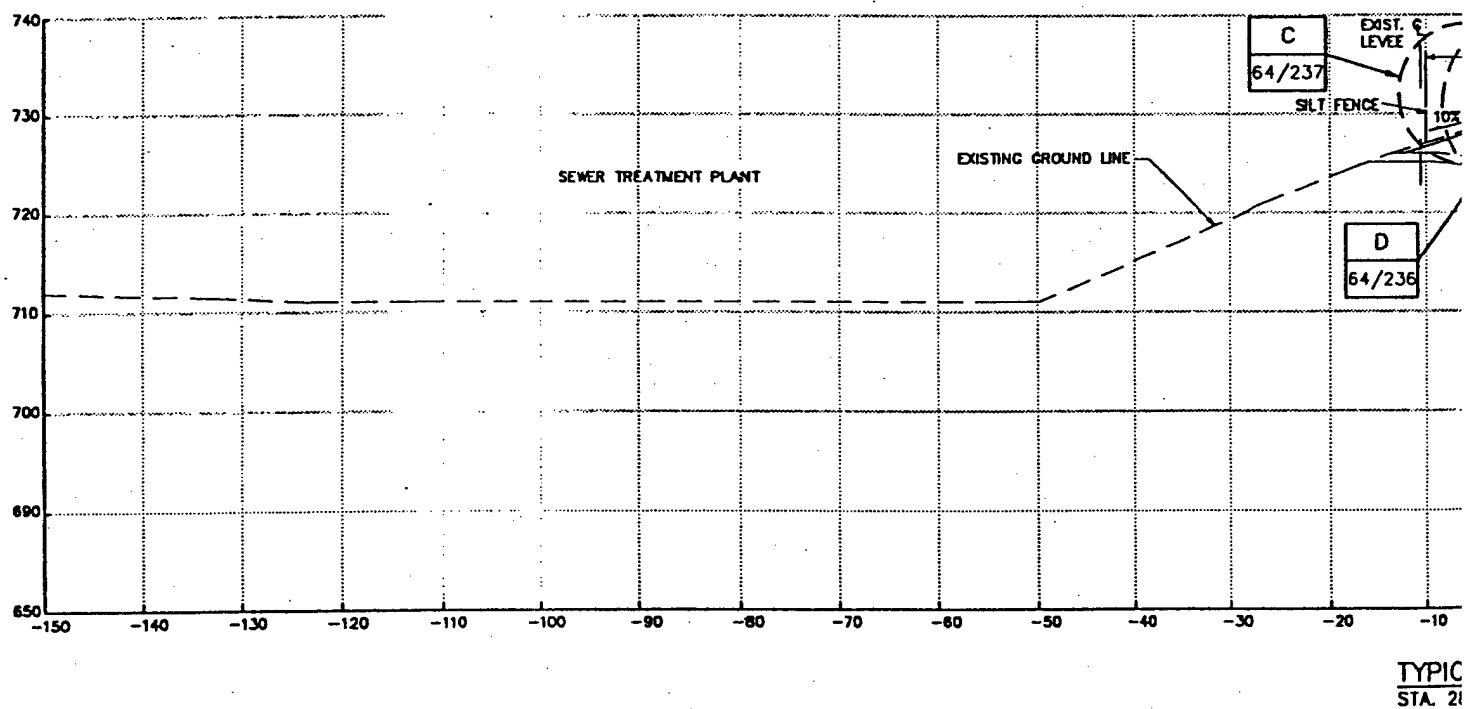
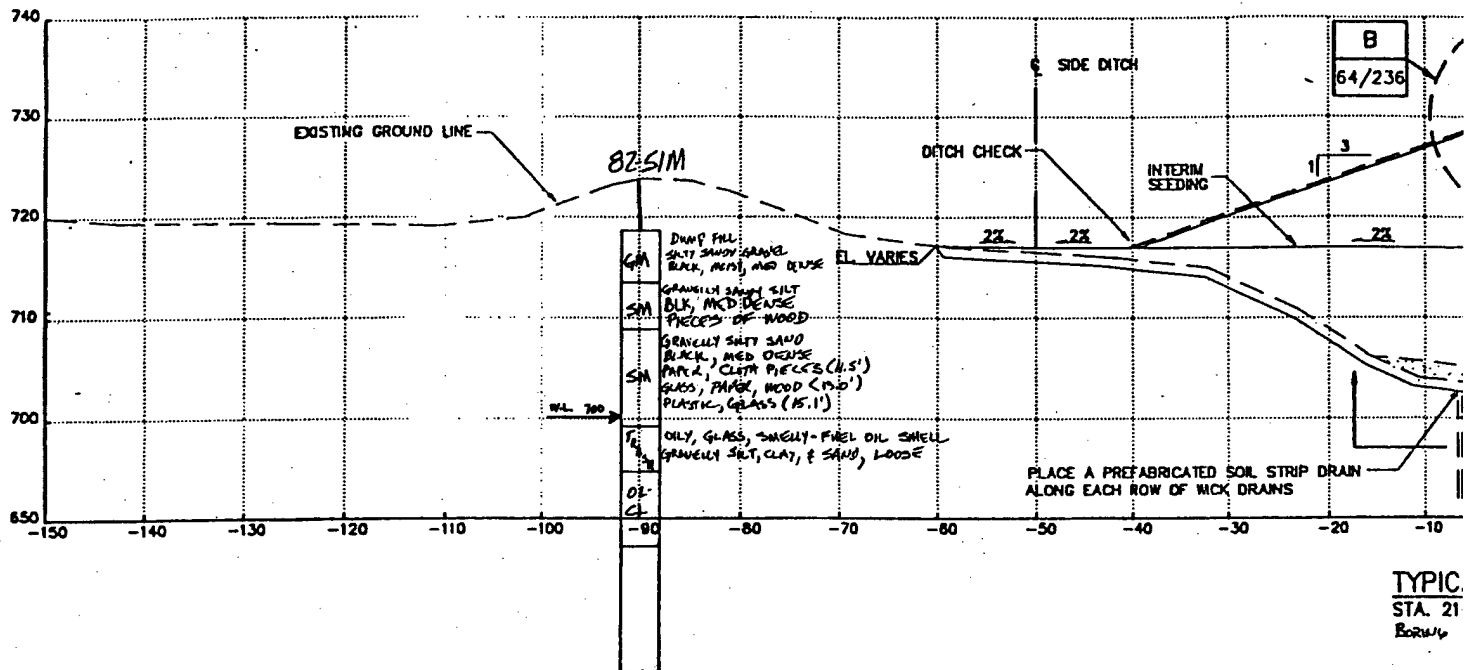
CONTROL DETAILS 64/237



2

FIGURE 35

SYMBOL	DESCRIPTION	DATE	APPROVAL
	PLANNING TRANSPORTATION DESIGNING URBAN DESIGN		
DESIGNED: TJS		DEPARTMENT OF THE ARMY	
DRAWN: BOR		ST. PAUL DISTRICT, CORPS OF ENGINEERS	
CHECKED:		ST. PAUL, MINNESOTA	
SUBMITTED BY:		FLOOD CONTROL - MINNESOTA RIVER	
		CHASKA PROJECT CHASKA, MINNESOTA	
		CHASKA STAGE 4	

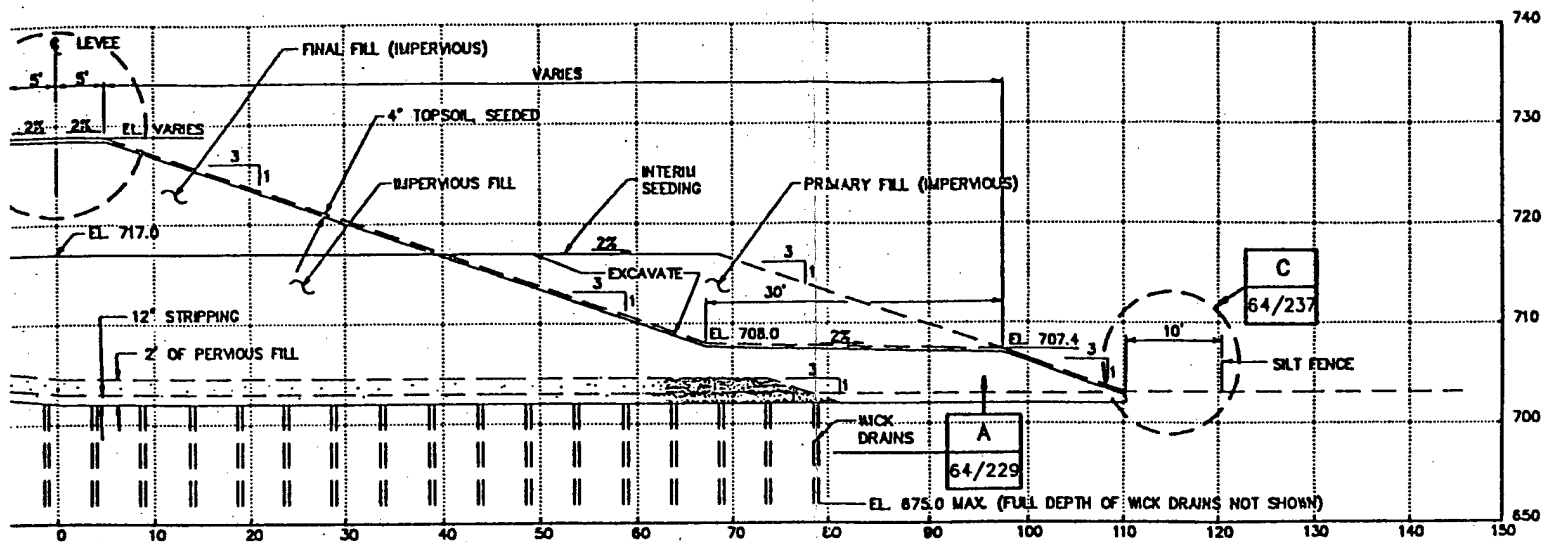


NOTES:

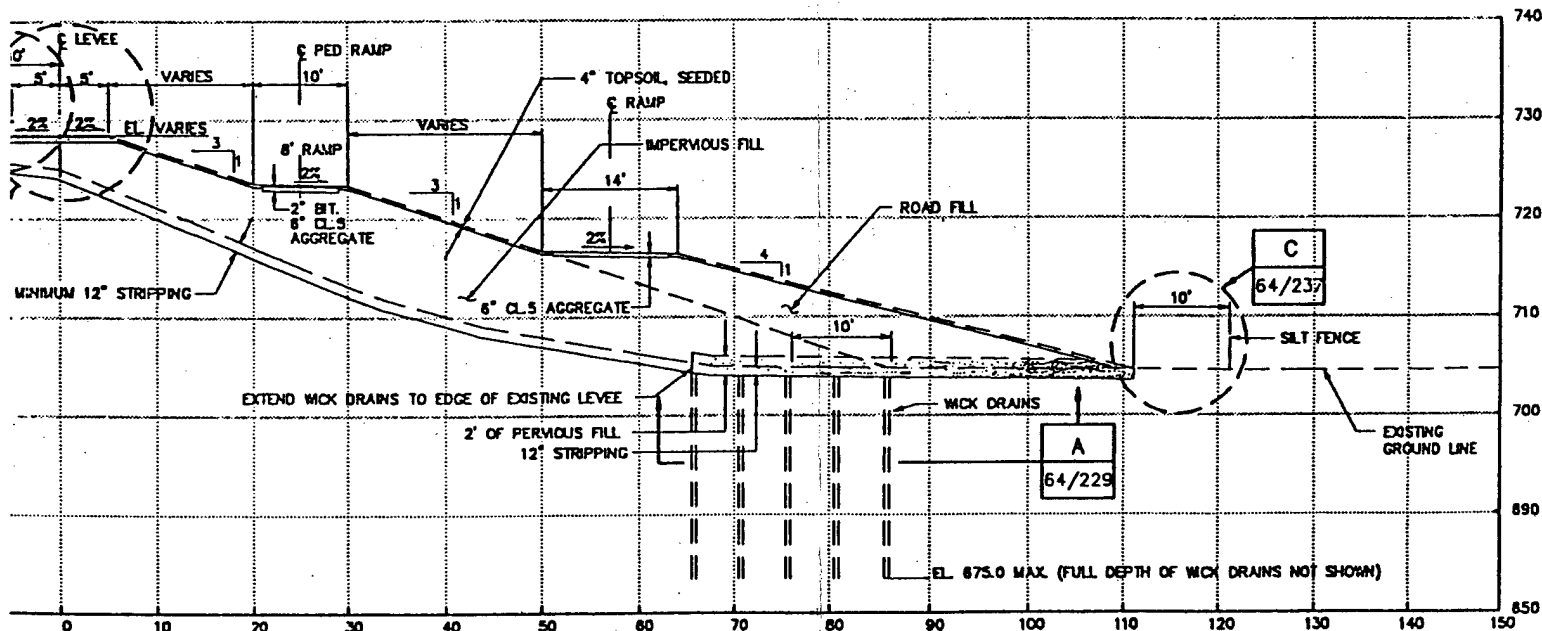
1. 8' PATH TIES IN
2. PLACE TEMPORA LEVEE TO PROTE

REFERENCES

1. TEMPORARY ERC



AL SECTION 3
 00 TO STA. 28+85
 12-CLM @ 23+80



AL SECTION 4
 +85 TO STA. 32+00
 64/222
 64/223

2


D EXISTING BRIDGE AT STA. 30+25±
 Y SILT FENCE AT THE TOP OF EXISTING
 T SEWER TREATMENT PLANT.

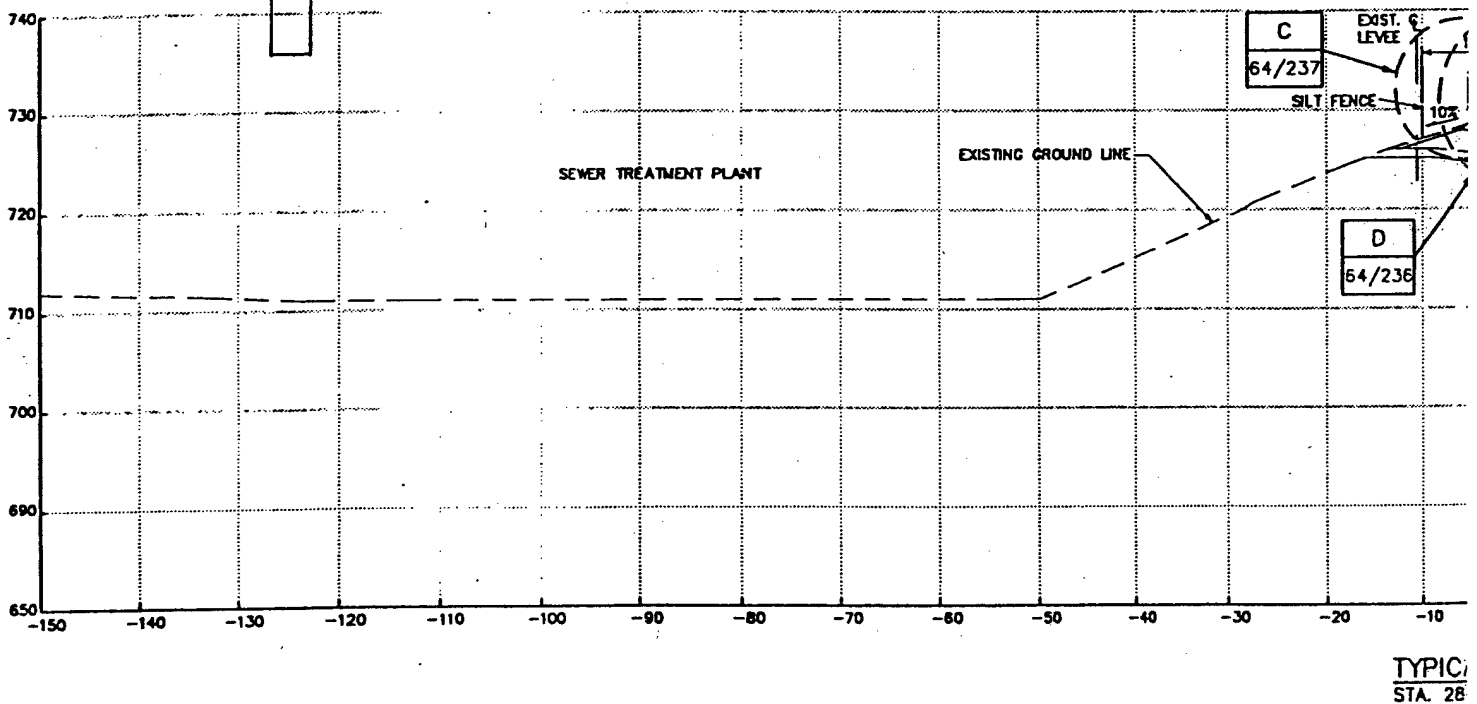
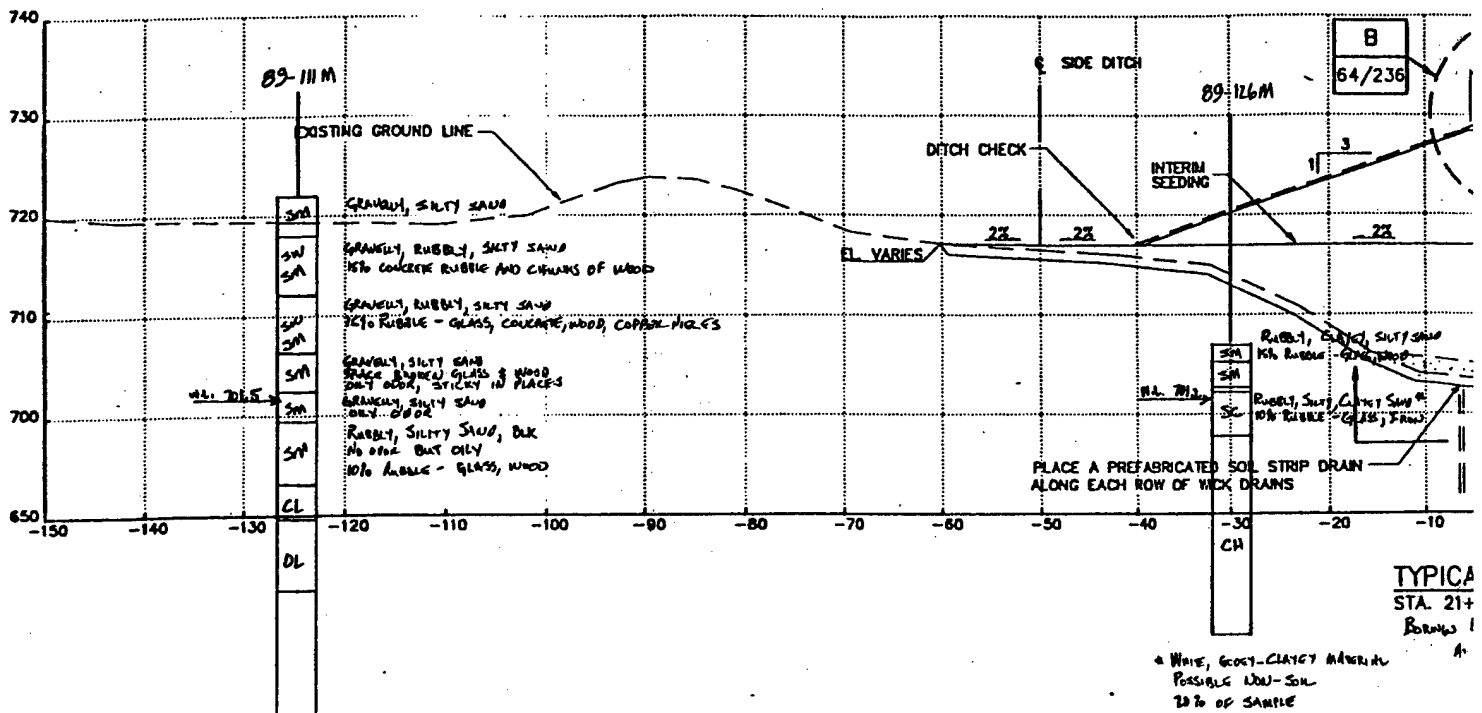
DWG. NO.

SON CONTROL DETAILS — — — — — 64/237



FIGURE 36

SYMBOL	DESCRIPTION	DATE	APPROVA
<div style="display: flex; justify-content: space-between;"> <div>  <p>BRW BROWN, RICHARDS & WILSON, INC. PLANNING TRANSPORTATION ENGINEERING URBAN DESIGN</p> </div> <div> <p>DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA</p> </div> </div>			
<p>DESIGNED: TJS DRAWN: HKR CHECKED: SUBMITTED BY:</p>			
<p>FLOOD CONTROL — MINNESOTA RIVER CHASKA PROJECT CHASKA, MINNESOTA CHASKA STAGE 4 DRAINAGE & LEVEES</p>			

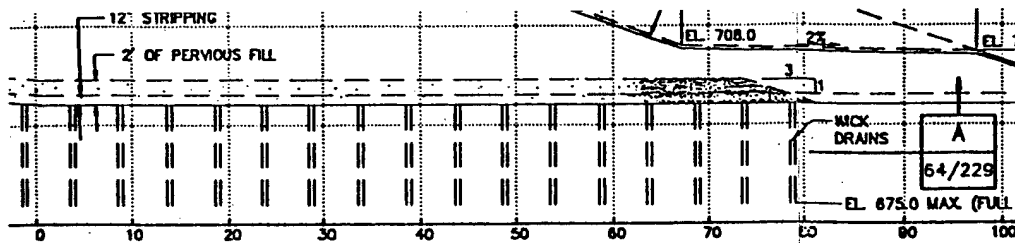


NOTES:

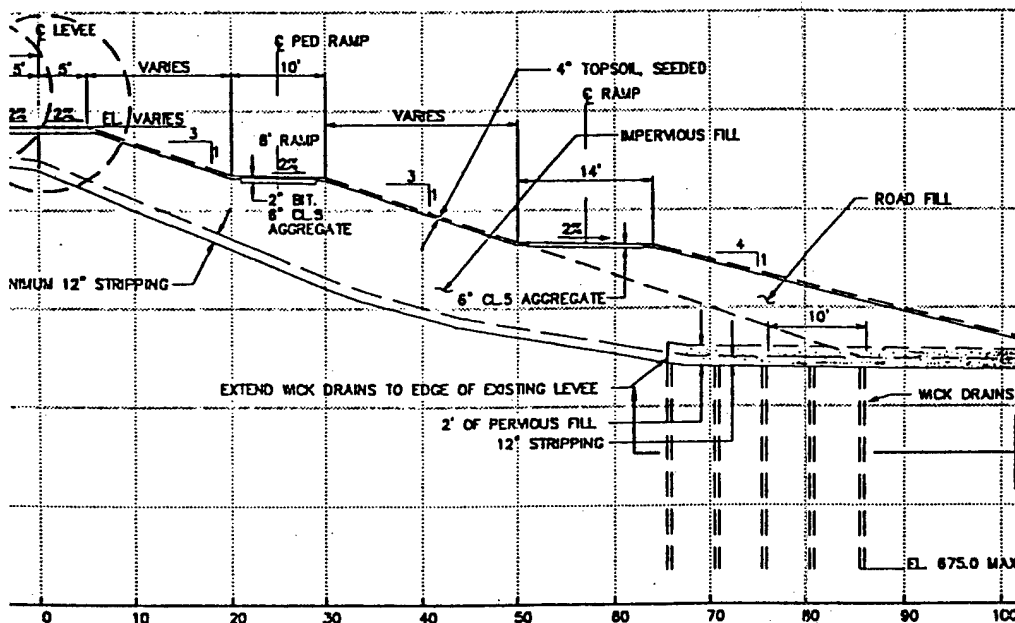
1. B' PATH TIES INT
2. PLACE TEMPORAR LEVEE TO PROTEC

REFERENCES:

1. TEMPORARY EROS



SECTION 3
 TO STA. 28+85
 MA 89-126 at
 Station 26+50



SECTION 4
 TO STA. 32+00
 MA 89-126 at
 Station 30+50

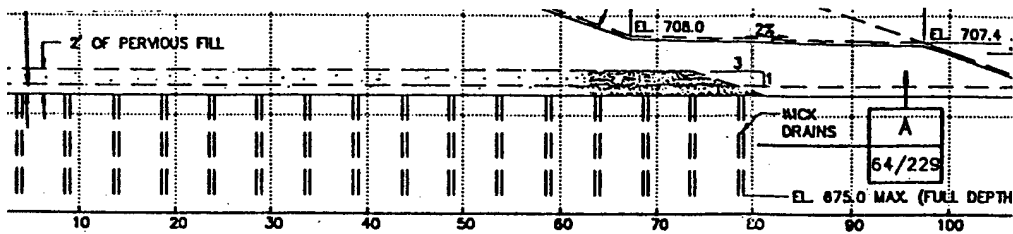
EXISTING BRIDGE AT STA. 30+25±
 SILT FENCE AT THE TOP OF EXISTING
 SEWER TREATMENT PLANT.

DWG. NO.

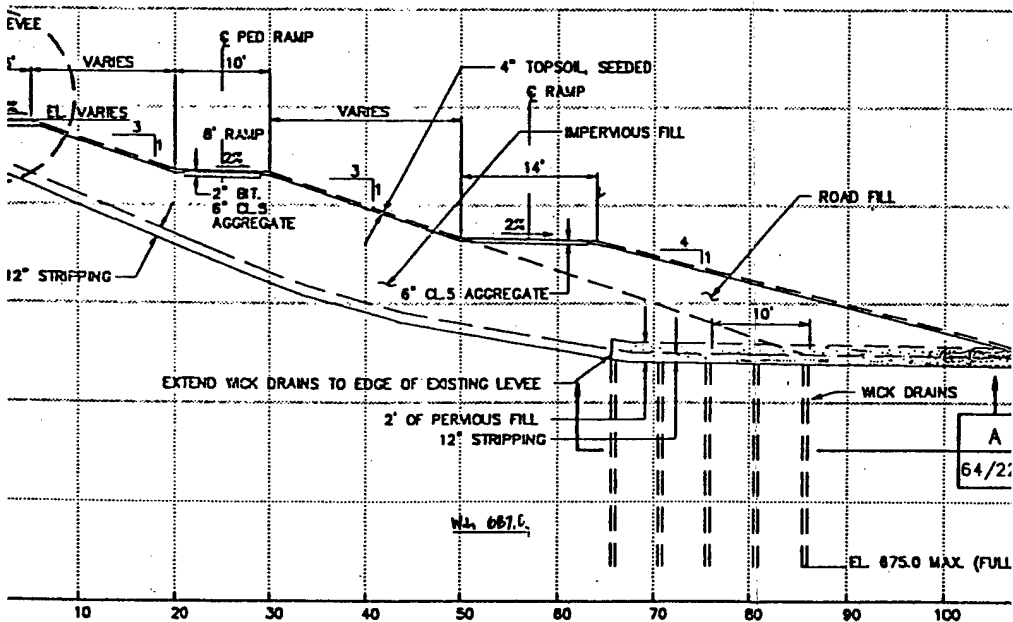
N CONTROL DETAILS 64/237



SYMBOL	
BRW	
DESIGNED: TJS	
DRAWN: IKR	
CHECKED:	
SUBMITTED BY:	



SECTION 3
STA. 28+85 64/222



SECTION 4
STA. 32+00 64/222
@ STA 29+60 64/223

2

BRIDGE AT STA. 30+25±
ICE AT THE TOP OF EXISTING
TREATMENT PLANT.

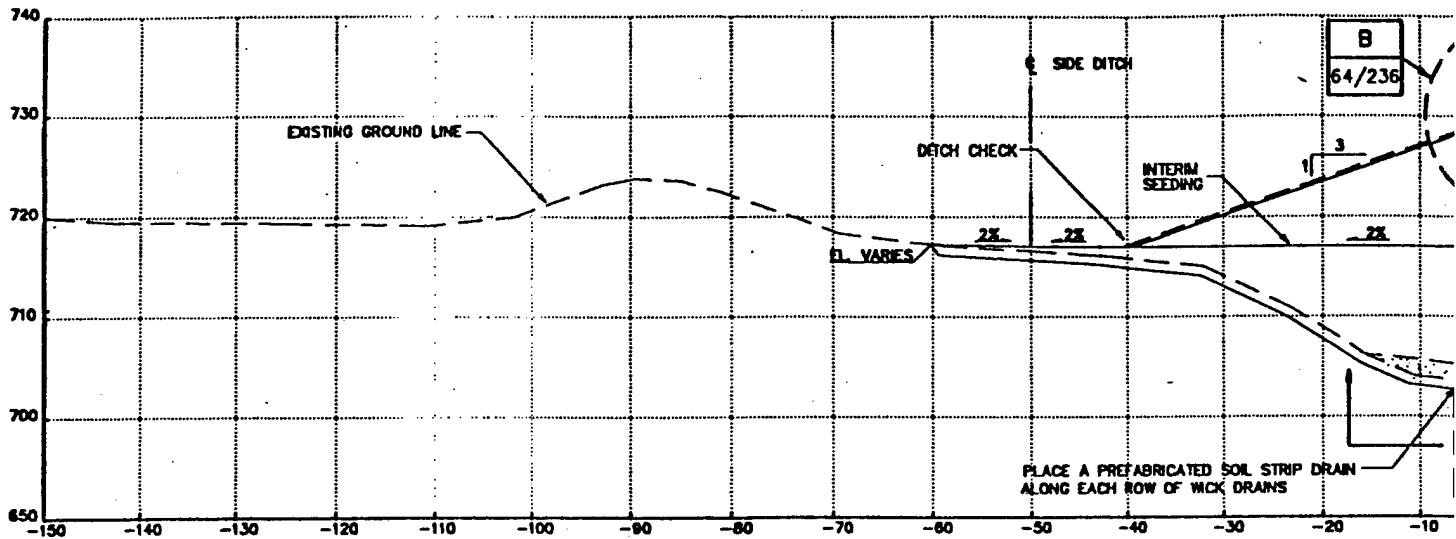
DWG. NO.

10L DETAILS — — — — — 64/237

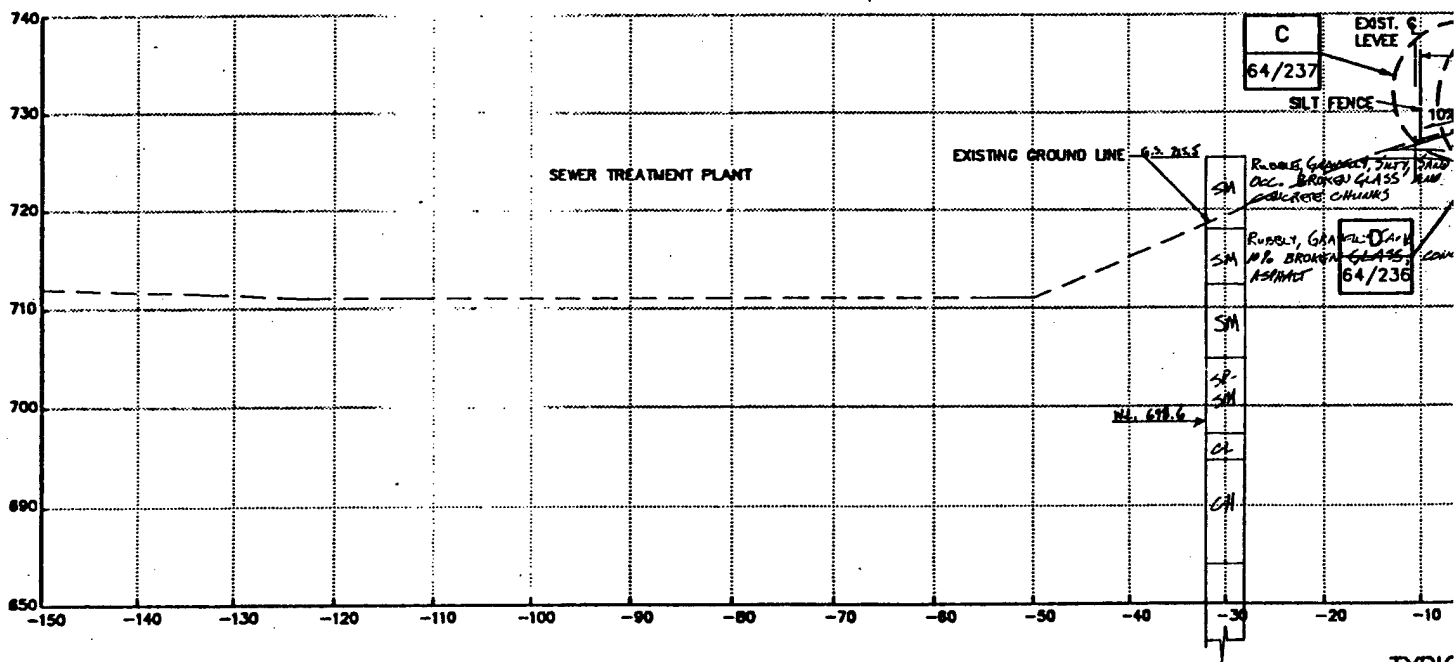


SYMBOL	
DESIGNED: TJS	
DRAWN: IKR	
CHECKED:	
SUBMITTED BY:	

Ch



TYPIC
STA. 21



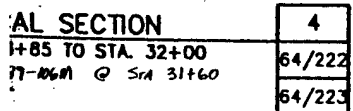
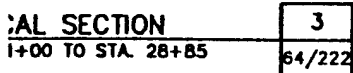
TYPIC
STA. 2
BORNE


NOTES:

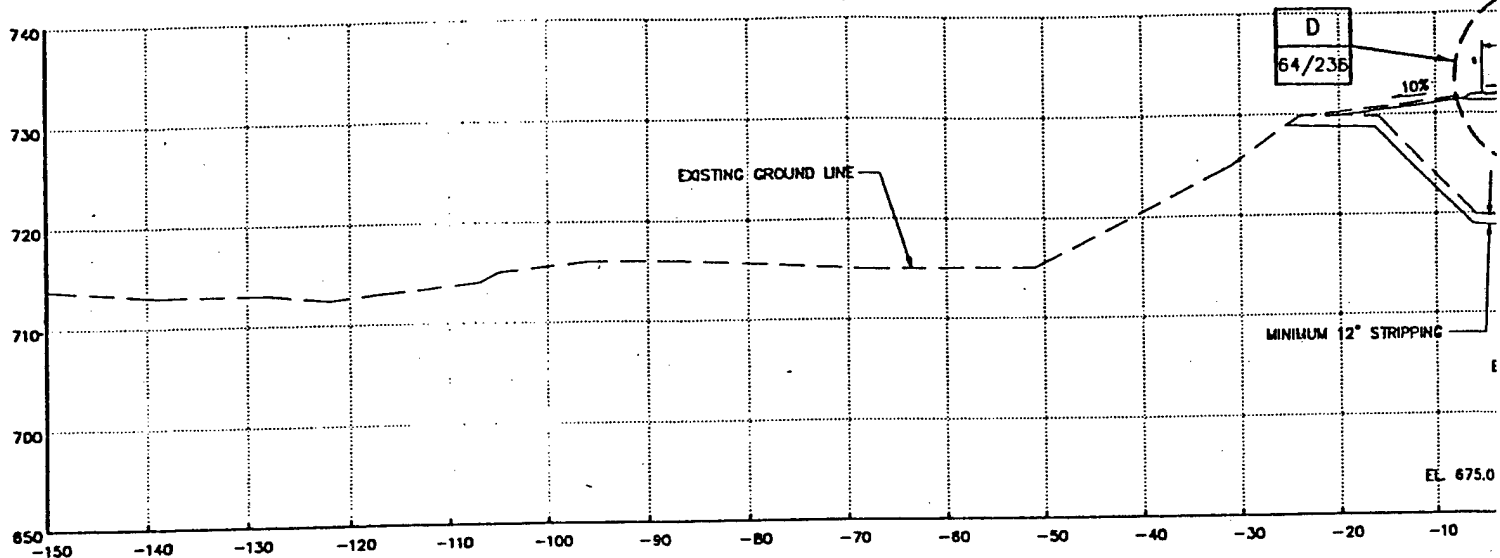
1. 8' PATH TIES IN
2. PLACE TEMPORARY LEVEE TO PROTECT

REFERENCES

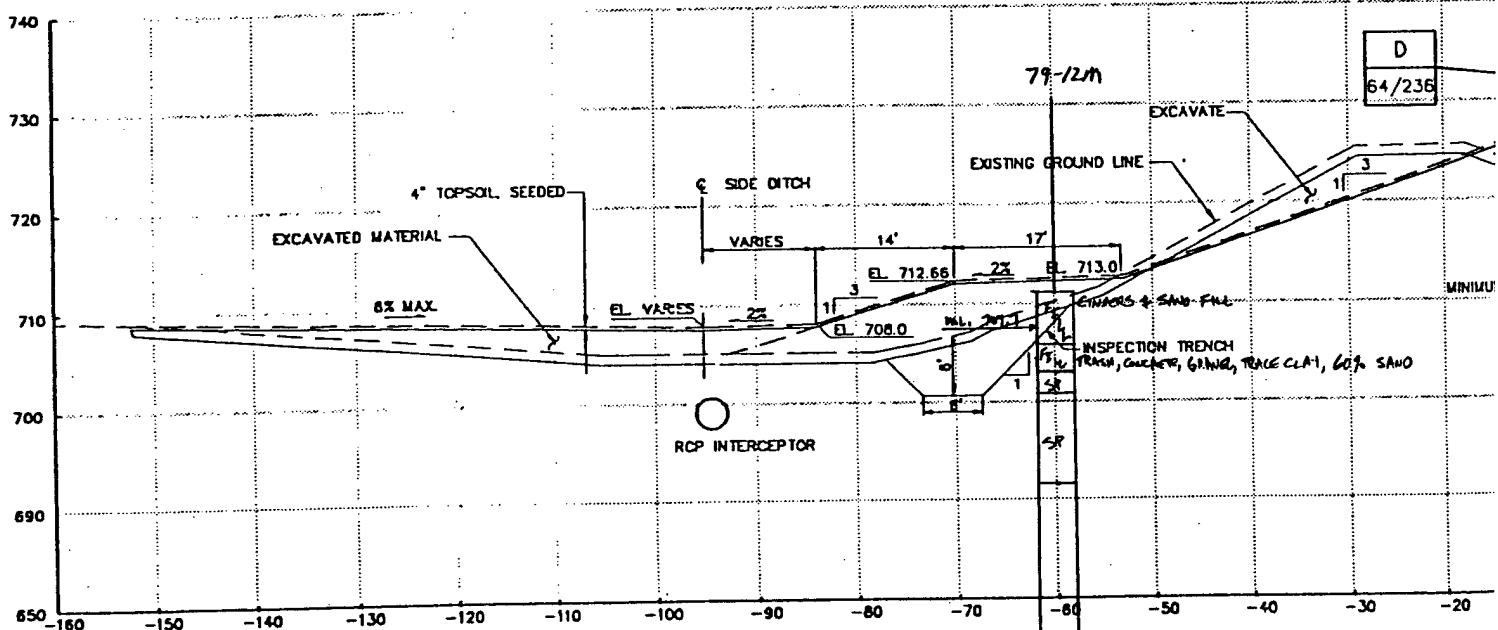
1. TEMPORARY EROSION CONTROL



SYMBOL	
	
BY: INC. ENGINEER NAME, NO.	
DESIGNED: TJS	
DRAWN: MCR	
CHECKED: _____	
SUBMITTED BY: _____	



TYPICAL
STA. 32+



TYPICAL
STA. 35+
BORING 79

NOTES:

1. REFER TO INTERC DITCH GRADES.

REFERENCES:

1. TEMPORARY EROSION CONTROL
2. EAST INTERCEPTOR

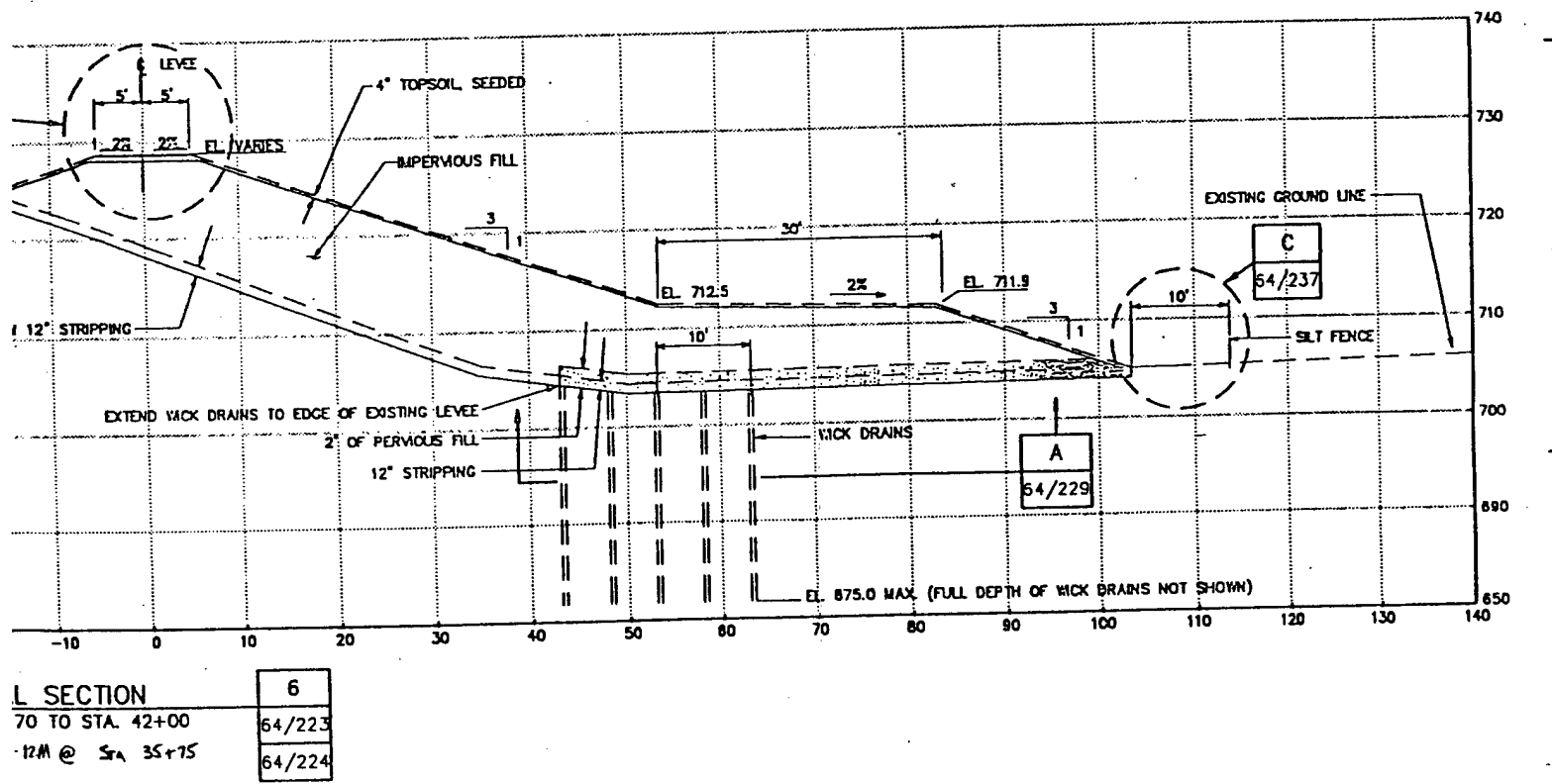
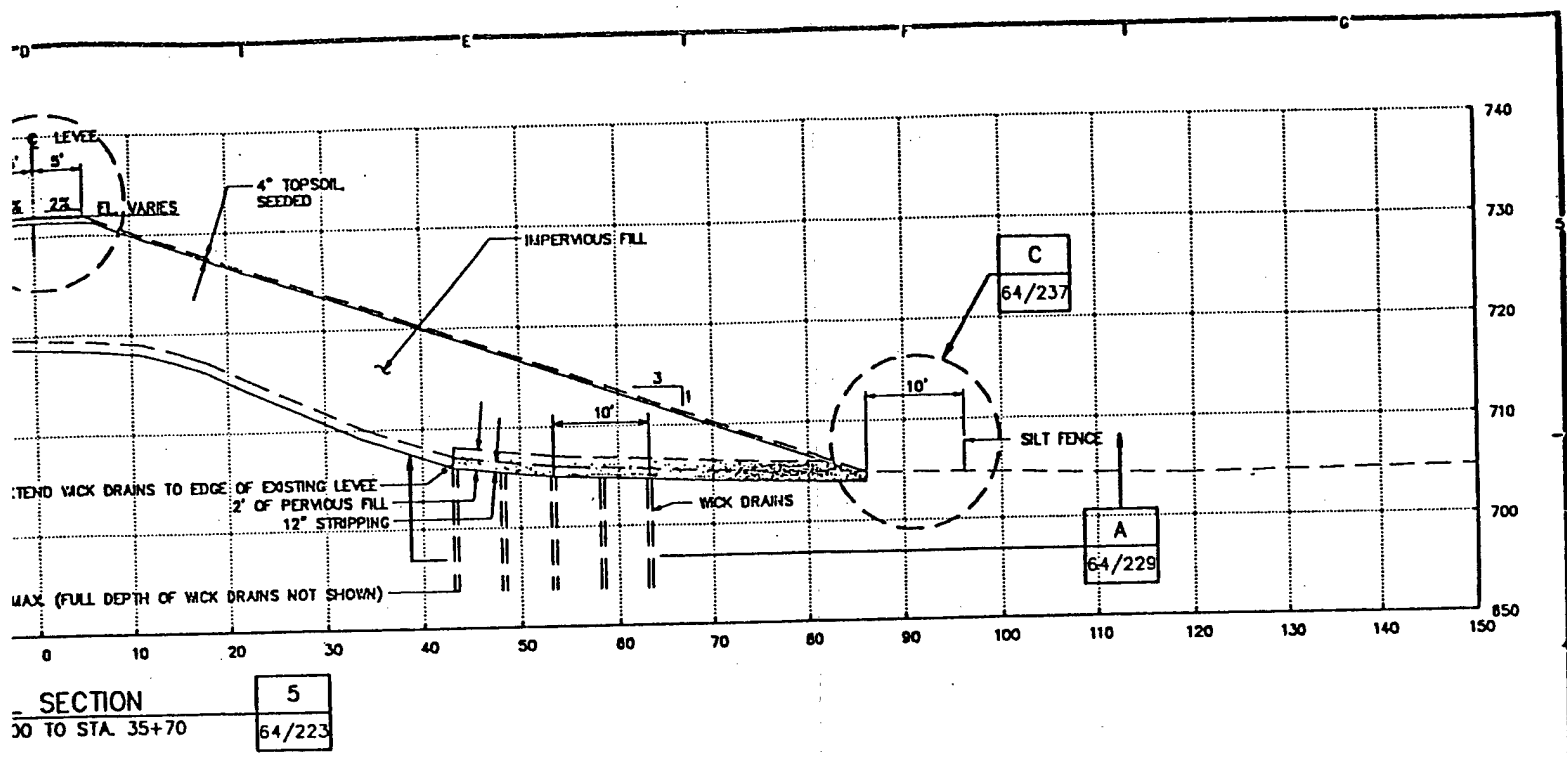


FIGURE 40

2

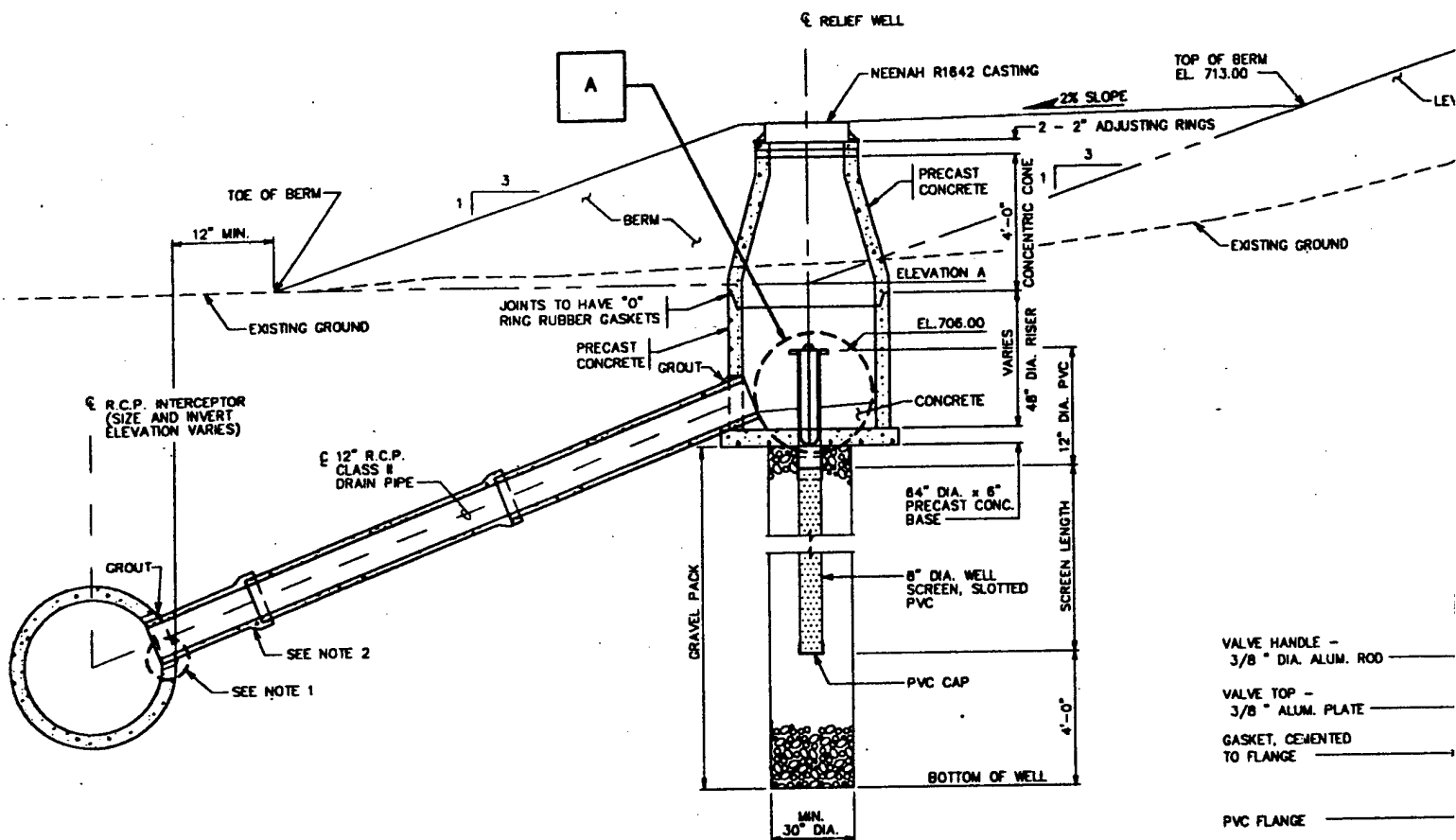
SEPTOR PIPE PROFILE SHEETS FOR SIDE

DWG. NO.

SIGN CONTROL DETAILS ——— 64/237
OR PIPE ——— 64/255

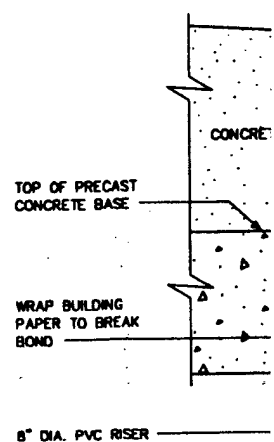
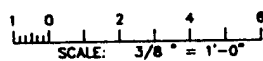


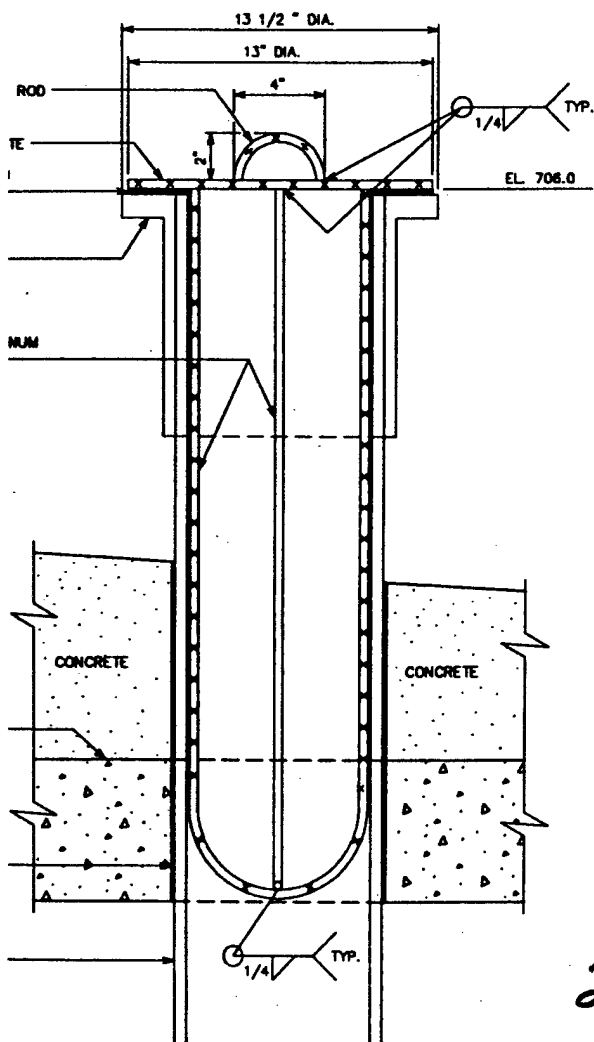
SYMBOL	DESCRIPTION	DATE	APPROVAL
(D) (R) (W)	PLANNING TRANSPORTATION DESIGNING URBAN DESIG		
<p>DESIGNED: TJS DRAWN: IKR CHECKED: SUBMITTED BY:</p>			
<p>DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA</p>			
<p>FLOOD CONTROL - MINNESOTA RIVER CHASKA PROJECT - CHASKA, MINNESOTA CHASKA STAGE 4 DRAINAGE & LEVEES</p>			



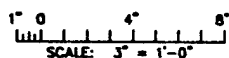
- VALVE HANDLE - 3/8" DIA. ALUM. ROD
- VALVE TOP - 3/8" ALUM. PLATE
- GASKET, CEMENTED TO FLANGE
- PVC FLANGE
- VALVE GUIDE - 3/8" DIA. ALUMINUM RODS

**TYPICAL SECTION
RELIEF WELL**





DETAIL
VALVE & RISER TOP



RELIEF WELL SCHEDULE							
WELL NO.	COORDINATES		LEVEE STA.	CASTING RIM ELEVATION	ELEVATION A	WELL SCREEN LENGTH (FT)	REMARKS
	X	Y					
RW-1	210354.8230	650182.3283	60+66	712.76	709.00	10	
RW-2	210366.6876	650258.1886	59+40	712.76	709.00	38	
RW-3	210370.6863	650270.0033	59+00	712.76	709.00	38	
RW-4	210377.6275	650295.8071	58+20	712.76	709.00	38	
RW-5	210384.7196	650328.8043	57+40	712.76	709.00	38	
RW-6	210391.4890	650367.9837	56+60	712.76	709.00	38	
RW-7	210398.2330	650407.1370	55+80	712.76	709.00	39	
RW-8	210408.1744	650460.5014	54+66.5	712.76	709.00	39	
RW-9	2104160.6974	650488.8573	53+92.5	712.76	709.00	39	
RW-10	2104232.2040	650513.7557	53+18.5	712.76	709.00	39	
RW-11	2104305.5899	650535.9383	52+44.5	712.76	709.00	39	
RW-12	2104376.5639	650555.8489	51+70.5	712.76	709.00	48	
RW-13	2104443.5173	650571.2820	51+03.5	712.76	709.00	48	
RW-14	2104508.4708	650587.7152	50+36.5	712.76	709.00	48	
RW-15	2104573.4316	650604.1192	49+69.5	712.76	709.00	48	
RW-16	2104638.3851	650620.5524	48+02.5	712.76	709.00	48	
RW-17	2104703.3366	650636.9855	48+35.5	712.76	709.00	60	
RW-18	2104748.7892	650648.4012	47+89.5	712.76	709.00	60	
RW-19	2104797.3697	650661.1149	47+43.5	712.70	708.00	60	
RW-20	2104847.6441	650667.2882	46+97.5	712.70	708.00	60	
RW-21	2104898.5313	650689.7126	46+51.5	712.70	708.00	60	
RW-22	2104945.7472	650669.3990	46+05.5	712.70	708.00	60	
RW-23	2104985.6130	650670.2043	45+59.5	712.70	708.00	60	
RW-24	2105021.6389	650678.2040	45+13.5	712.70	708.00	60	
RW-25	2105056.3430	650687.5571	44+67.5	712.70	708.00	60	
RW-26	2105091.2016	650705.0602	44+21.5	712.70	708.00	59	
RW-27	2105154.0196	650739.8329	43+49.7	712.70	708.00	59	
RW-28	2105217.2021	650774.7731	42+77.5	712.70	708.00	59	
RW-29	2105280.1951	650809.6426	42+05.5	712.70	708.00	59	
RW-30	2105343.2026	650844.4859	41+33.5	712.70	708.00	59	
RW-31	2105388.5032	650877.5716	40+61.5	712.70	708.00	58	
RW-32	2105428.8112	650917.7983	39+89.5	712.82	710.00	59	
RW-33	2105477.2479	651004.8521	38+87.5	712.82	710.00	59	
RW-34	2105526.7172	651093.8529	37+85.5	712.82	710.00	59	
RW-35	2105576.1953	651183.0624	36+83.5	712.82	710.00	59	
RW-36	2105625.8395	651272.1529	35+81.5	712.82	710.00	59	

NOTES:


1. DRAIN PIPES SHALL INTERSECT INTERCEPTOR AT 90°.
2. PRECAST CONCRETE TEE WITH 12" BELL SECTION MAY BE USED IN LIEU OF THIS DETAIL.

REFERENCES:

DWG. NO.

1. EAST/WEST INTERCEPTOR PIPE PROFILE _ _ _ _ _ 64/255, 64/256
2. LEVEE PLAN & PROFILE _ _ _ _ _ 64/220, 64/228

64/220-6
FIGURE 4

SYMBOL		DESCRIPTION		DATE	APPROVAL
		PLANNING TRANSPORTATION ENGINEERING URBAN DESIGN		DEPARTMENT OF THE ARMY ST. PAUL DISTRICT, CORPS OF ENGINEERS ST. PAUL, MINNESOTA	
DESIGNED: TJS DRAWING: JAS CHECKED: MKM SUBMITTED BY: ED-0 ED-GH					
DATE: 1987-29-92		CAD FILE NAME: RELIEF.DWG SPEC NO:		DRAWING NUMBER: M34-CH-R-84/254	
				SHT	55
				OF	119

APPENDIX B

DRILLING LOG		DIVISION		INSTALLATION		SHEET 1 OF 6 SHEETS	
1. PROJECT CHASKA		2. LOCATION (Coordinates or Station) 650 800 N 2, 106, 600 E		10. SIZE AND TYPE OF BIT 1 3/4" X 2" Sampler		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL	
3. DRILLING AGENCY Geotechnical Engineering		4. HOLE NO. (As shown on drawing title and file number) 73-2M		12. MANUFACTURER'S DESIGNATION OF DRILL Central Mines		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 14 Jars	
5. NAME OF DRILLER Oel Johnston		6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		14. TOTAL NUMBER CORE BOXES		15. ELEVATION GROUND WATER 701.5	
7. THICKNESS OF OVERBURDEN		8. DEPTH DRILLED INTO ROCK		16. DATE HOLE 3/1/73		17. ELEVATION TOP OF HOLE 701.5 Est. from Topog.	
9. TOTAL DEPTH OF HOLE 52.0		10. SIGNATURE OF INSPECTOR R. D. Johnston		18. TOTAL CORE RECOVERY FOR BORING not applicable		19. SIGNATURE OF INSPECTOR	
ELEVATION 701.5	DEPTH 0.0	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	
			ICE			Note: 1. Elevations estimated from topog. 2. No duplicate samples taken 3. Boring drilled with 1 3/8" X 2" Sampler driven with a 140 lb hammer falling 30". Sampler was driven 2.5'. Blow count recorded for top 1.5' of each drive. 4. Cleaned out after each drive with hollow-stem auger.	
700.5	1.0		SILTY CLAY (CH-OH) VERY SOFT HIGH PLASTICITY ORGANIC DK. GRAY 1. Snail shells present 2. Has odor	2.5	5#1 Jar 1.0 to 2.0		
	2.0			2.5	W.H.		
	3.0			3.0	5#2 Jar 3.0 to 3.5		
	4.0		0.2 seam med. sand	3.5			
697.5	4.0		SILTY CLAY (CH-OH) SOFT HIGH PLASTICITY WET DK. GRAY 1. Occasional thin sand strata (0.1') present. 3. Organic content varies. Some highly organic seams up to 0.3' thick 4. Calcareous 5. Small shells present. Recent Alluvium	4.5	5#3 Jar 6.5 to 7.0		
	5.0			5.0	W.H.		
	6.0			5.5	1		
	7.0			6.0	1		
	8.0			7.0	1		
	9.0			7.5	1		
	10.0			8.0	1		
				8.5	1		
				9.0	1		
				9.5	1		
				10.0	1		

DRILLING LOG		DIVISION		INSTALLATION		SHEET 3 OF 10 SHEETS	
1. PROJECT CHASKA				10. SIZE AND TYPE OF BIT			
2. LOCATION (Coordinates or Station)				11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY				12. MANUFACTURER'S DESIGNATION OF DRILL			
4. HOLE NO. (As shown on drawing title and file number) 73-2M				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED UNDISTURBED	
5. NAME OF DRILLER				14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				15. ELEVATION GROUND WATER		16. DATE HOLE	
7. THICKNESS OF OVERBURDEN				17. ELEVATION TOP OF HOLE		18. TOTAL CORE RECOVERY FOR BORING %	
8. DEPTH DRILLED INTO ROCK				19. SIGNATURE OF INSPECTOR			
9. TOTAL DEPTH OF HOLE							
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	
681.5	20.0	c					
	21.0		SILTY CLAY (CH-OH)	1			
	22.0		SOFT HIGH PLASTICITY WET DK. GRAY	1			
	23.0		(see page 1 for Supplemental notes)	1			
	24.0		Recent Alluvium	1			
976.5	25.0		SANDY GRAVELLY CLAY (CH)	23			
975.8	25.7		BROWN - GRAY	10			
	26.0		CLAYEY SILT MED. DENSE (ML-CL)	12			
	27.0		LOW PLASTICITY MOIST-WET GRAY-BROWN MOTTLED	8			
	28.0		very Calcareous	8			
	29.0			2			
	30.0						
	31.0						
	32.0						
	33.0						
	34.0						
	35.0						
	36.0						
	37.0						
	38.0						
	39.0						
	40.0						
	41.0						
	42.0						
	43.0						
	44.0						
	45.0						
	46.0						
	47.0						
	48.0						
	49.0						
	50.0						
	51.0						
	52.0						
	53.0						
	54.0						
	55.0						
	56.0						
	57.0						
	58.0						
	59.0						
	60.0						
	61.0						
	62.0						
	63.0						
	64.0						
	65.0						
	66.0						
	67.0						
	68.0						
	69.0						
	70.0						
	71.0						
	72.0						
	73.0						
	74.0						
	75.0						
	76.0						
	77.0						
	78.0						
	79.0						
	80.0						
	81.0						
	82.0						
	83.0						
	84.0						
	85.0						
	86.0						
	87.0						
	88.0						
	89.0						
	90.0						
	91.0						
	92.0						
	93.0						
	94.0						
	95.0						
	96.0						
	97.0						
	98.0						
	99.0						
	100.0						

DRILLING LOG		DIVISION NCD	INSTALLATION St. Paul Dist.	SHEET 4
1. PROJECT CHASKA		10. SIZE AND TYPE OF BIT		
2. LOCATION (Coordinates or Station)		11. DATUM FOR ELEVATION SHOWN (TBM or MSL)		
3. DRILLING AGENCY		12. MANUFACTURER'S DESIGNATION OF DRILL		
4. HOLE NO. (As shown on drawing title and file number) 73-2M		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED
5. NAME OF DRILLER		14. TOTAL NUMBER CORE BOXES		UNDISTURBED
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER		
7. THICKNESS OF OVERBURDEN		16. DATE HOLE STARTED COMPLETED		
8. DEPTH DRILLED INTO ROCK		17. ELEVATION TOP OF HOLE 701.5		
9. TOTAL DEPTH OF HOLE		18. TOTAL CORE RECOVERY FOR BORING %		
		19. SIGNATURE OF INSPECTOR		

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVER- ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
671.5	30.0		CLAYEY SILT MED DENSE (ML-CL) 30.5	4		
				12		
	31.0		LOW PLASTICITY 31.0			
			MOIST-WET GRAY-BROWN MOTTLED			
	32.0				549	
			Very Calcareous 32.0	12	JAR	
					32.5	
				18	TO	
	33.0				33.5	
				21		
969.10	33.5					
	34.0		SILTY CLAY (CH) VERY STIFF			
			MED. PLAST. 34.5		5410	
			MOIST	11	34.5	Represents Clay
	35.0		GRAY 35.0		TO	
				8	35.0	
			Stratified with 35.5		8411	
			clayey silt (ML)	12	JAR	
	36.0		med. dense 36.0		35.0	Representative
			low to non plastic		36.0	of clayey silt
			saturated			strata
			gray			
	37.0		Strata vary from 37.0			
			0.1' to 0.4' thick	7		
963.0	37.5					
	38.0		SILTY CLAY (CH) WITH SILT LAMINAE 38.0	9	5412	
			VERY STIFF	12	JAR	
			MOIST		38.0	
			GRAY		TO	
	39.0		1. Calcareous 39.5		39.5	
			2. Occasional thin 39.5			
			(0.1'-0.3') Sandy Strata.	8		
	40.0					

DRILLING LOG		DIVISION	INSTALLATION		SHEET	
1. PROJECT CHASKA		UCD	St. Paul Dism		5 OF 6 SHEETS	
2. LOCATION (Coordinates or Station)		10. SIZE AND TYPE OF BIT				
3. DRILLING AGENCY		11. DATUM FOR ELEVATION SHOWN (TBM or MSL)				
4. HOLE NO. (As shown on drawing title and file number)		12. MANUFACTURER'S DESIGNATION OF DRILL				
5. NAME OF DRILLER		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED	UNDISTURBED	
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		14. TOTAL NUMBER CORE BOXES		15. ELEVATION GROUND WATER		
7. THICKNESS OF OVERBURDEN		16. DATE HOLE		STARTED	COMPLETED	
8. DEPTH DRILLED INTO ROCK		17. ELEVATION TOP OF HOLE		701.5		
9. TOTAL DEPTH OF HOLE		18. TOTAL CORE RECOVERY FOR BORING		%		
		19. SIGNATURE OF INSPECTOR				
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
661.5	400					
	410		SILTY CLAY WITH SILT LAMINAE	9		
	420		VERY STIFF MOIST GRAY	14		
	430		1. Calcareous 2. occasional Thin (0.1'-0.3') Sandy Strata	4		
	440		3. Appears more lacustrine than fluvial in origin.	8		
	450			10		
	460					
	470			5		
	480			8		
	490			15		
	500			5		
	510			9		
	520			13		
	530					
	540			11		

DRILLING LOG		DIVISION <i>WED</i>	INSTALLATION <i>St. Paul Det.</i>	Hole No. <i>73-2M</i>		SHEET OF <i>6</i> SHEETS
1. PROJECT <i>CHASKA</i>			10. SIZE AND TYPE OF BIT			
2. LOCATION (Coordinates or Station)			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY			12. MANUFACTURER'S DESIGNATION OF DRILL			
4. HOLE NO. (As shown on drawing title and file number) <i>73-2M</i>			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED UNDISTURBED	
5. NAME OF DRILLER			14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER			
7. THICKNESS OF OVERBURDEN			16. DATE HOLE		STARTED COMPLETED	
8. DEPTH DRILLED INTO ROCK			17. ELEVATION TOP OF HOLE <i>701.5</i>			
9. TOTAL DEPTH OF HOLE			18. TOTAL CORE RECOVERY FOR BORING %			
			19. SIGNATURE OF INSPECTOR			

ELEVATION <i>654.5</i>	DEPTH <i>50.0</i>	LEGEND <i>c</i>	CLASSIFICATION OF MATERIALS (Description) <i>d</i>	% CORE RECOVERY <i>e</i>	BOX OR SAMPLE NO. <i>f</i>	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) <i>g</i>
			<i>SILTY CLAY (CH) WITH SILT LAMINAE VERY STIFF MOIST GRAY 1. Calcareous 2. Occasional thin (0.1'-0.3') sandy strata.</i>	<i>50.5</i>	<i>13</i>	
	<i>51.0</i>			<i>51.0</i>	<i>23</i>	
<i>649.5</i>	<i>52.0</i>		<i>BOTTOM OF HOLE</i>			
	<i>53.0</i>					
	<i>54.0</i>					
	<i>55.0</i>					
	<i>56.0</i>					
	<i>57.0</i>					
	<i>58.0</i>					
	<i>59.0</i>					
	<i>60.0</i>					
	<i>61.0</i>					
	<i>62.0</i>					

DRILLING LOG		DIVISION		INSTALLATION		SHEET	
PROJECT		NCD.		ST. Paul DISTRICT		1 OF 1 SHEETS	
1. PROJECT		CHASKA DIKE		10. SIZE AND TYPE OF BIT		2 1/2" ROLLER	
2. LOCATION (Coordinate or Station)		370 E. of Maple, 250 S. of 1st St.		11. DAYUM FOR ELEVATION SHOWN (TBM & MSL)		MSL	
3. DRILLING AGENCY		2502		12. MANUFACTURER'S DESIGNATION OF DRILL		CME 750	
4. HOLE NO. (As shown on drawing title and file number)		# 6 79-12M		13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 16 UNDISTURBED	
5. NAME OF DRILLER		SCHMIDTKECAT		14. TOTAL NUMBER CORE BOXES		15. ELEVATION GROUND WATER 3.5 (707.7)	
6. DIRECTION OF HOLE		<input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		16. DATE HOLE		STARTED 5-4-79 COMPLETED 5-4-79	
7. THICKNESS OF OVERBURDEN				17. ELEVATION TOP OF HOLE		711.2	
8. DEPTH DRILLED INTO ROCK				18. TOTAL CORE RECOVERY FOR BORING		%	
9. TOTAL DEPTH OF HOLE		55'		19. SIGNATURE OF INSPECTOR		K. Harmon	

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
711.2					2422	140 LB HAMMER 30" DROP 6" hollow stem 2 1/2" ROLLER BIT + DRILL MUD 2" x 2 1/2" x 3' BL 0-3'
	1	F	CINDERS + SAND fill		with	SAMPLE 1 1'-2' JAN
	2	L		57 1/2	pushed	
	3	C		23 R-2	pushed	BOT 3
	4	S			STD 3	STD. DRIVE 3'-5'
	5	SP			3	⑥
	6				3	
	7				3	
706.0	5.2			23 R-2	2422	BOT 5 2" x 2 1/2" DRIVE 5'-8'
	6	F	DK. BROWN TRASH fill CEMENT GRAVEL BITS OF CLAY 60% SAND SATURATED	57 1/2	with	SAMPLE 2 6'-7' JAN
	7	L			pushed	
	8			P-3 R-2.1	pushed	BOT 8
703.1	8.1				STD 4	STD DRIVE 8'-10'
	9	SP	DK. BROWN GRAVELLY SAND loose SATURATED 25% GRAVEL 75% FINE SAND	57 1/2	5	⑬ SAMPLE 3 8.1-9.0 JAN
	10				7	
	11				8	
701.2	10			P-2 R-1.9		BOT 10

DRILLING LOG		DIVISION	INSTALLATION	SHEET
PROJECT			ST. Paul DISTRICT	OF SHEETS
1. PROJECT		10. SIZE AND TYPE OF BIT		
CHASKA PIKE		11. DATUM FOR ELEVATION SHOWN (TBM or MSL)		
2. LOCATION (Coordinates or Station)		12. MANUFACTURER'S DESIGNATION OF DRILL		
3. DRILLING AGENCY		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		
4. HOLE NO. (As shown on drawing title and file number)		DISTURBED		
79-12M		UNDISTURBED		
5. NAME OF DRILLER		14. TOTAL NUMBER CORE BOXES		
6. DIRECTION OF HOLE		15. ELEVATION GROUND WATER		
<input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		16. DATE HOLE		
7. THICKNESS OF OVERBURDEN		STARTED		
8. DEPTH DRILLED INTO ROCK		COMPLETED		
9. TOTAL DEPTH OF HOLE		17. ELEVATION TOP OF HOLE		
		711.2		
		18. TOTAL CORE RECOVERY FOR BORING		
		19. SIGNATURE OF INSPECTOR		
		K. Harman		

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
701.2	10				2X 1/2	
701.0	10.2				HYD	
	11	SP	LT. BROWN FINE TO COARSE SAND MEDIUM SATURATED	57.4	WITH	NOTE WENT TO MUD + ROLLER BIT 15' 2" x 2 1/2" DRIVE 10-13. Sample 4 11'-12' JAR.
	12				PUSHED	
	13			P-3 R-2.2	PUSHED	
697.7	13.5				STD 6	STD DRIVE 13'-15'
	14	SP	LT. BROWN MED SAND MEDIUM SATURATED	57.5	9	
	15			13.5	10	Sample 5 13.5-14.5 JAR.
	16			0-2	10	ROT 15
	17			R-1.7	2X 1/2	2" x 2 1/2" DRIVE 15'-18'
	18				HYD	
695.0	16.2				WITH	
	17	SP	LT. BROWN FINE SAND MEDIUM SATURATED	57.6	PUSHED	Sample 6 16.2-17.0 JAR.
	18			P-3 R-2.2	PUSHED	
692.7	18.0				STD 9	STD DRIVE 18'-20'
	19				11	
	20	SP	LT. BR MED TO FINE SAND MEDIUM SATURATED	57.7	11	Sample 7 18.5-19.5
	21			18.5	12	
	22			19.5	13	
691.2	20			P-2 R-1.8	ROT 20	

DRILLING LOG		DIVISION		INSTALLATION		Hole No. <u>79-12</u>	
1. PROJECT <u>CHARRA DINE</u>				ST. Paul DISTRICT		SHEET <u>3</u> OF SHEETS	
2. LOCATION (Coordinates or Station)				10. SIZE AND TYPE OF BIT			
3. DRILLING AGENCY				11. DATUM FOR ELEVATION SHOWN (TBM or BSL)			
4. HOLE NO. (As shown on drawing title and file number) <u>79-12</u>				12. MANUFACTURER'S DESIGNATION OF DRILL			
5. NAME OF DRILLER				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED	
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				14. TOTAL NUMBER CORE BOXES		UNDISTURBED	
7. THICKNESS OF OVERBURDEN				15. ELEVATION GROUND WATER			
8. DEPTH DRILLED INTO ROCK				16. DATE HOLE		STARTED	
9. TOTAL DEPTH OF HOLE				17. ELEVATION TOP OF HOLE <u>711.2</u>		COMPLETED	
				18. TOTAL CORE RECOVERY FOR BORING			
				19. SIGNATURE OF INSPECTOR <u>K. Harmon</u>			
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	
691.1	20.1		LT. OR COARSE TO MCT SAND		2X2 1/2	2" x 2 1/2" DRIVE 20'-23'	
	21	SP	M. JENCO NOT SOME GRAVEL	STY 2 1/2	8	Sample 8 21'-22' JAR	
	22				19		
	23	SP	SAME	D-3 R-2	27	13T 23	
	24				5	STD DRIVE 23'-25'	
	25				8	(26)	
	26				12		
	27	SP	SAME	STY 2 1/2	13	BOT 25	
	28				8	2" x 2 1/2" DRIVE	
	29	SP		STY 2 1/2	4	Sample 9 26'-27' JAR	
	30				13	BOT 28	
					5	STD DRIVE 28'-30'	
					8	(19)	
					12	BOT 30	

DRILLING LOG		DIVISION	INSTALLATION	SHEET
1. PROJECT <i>CHASKA DIKE</i>		<i>ST. Paul DISTRICT</i>		<i>2</i>
2. LOCATION (Coordinates or Station)		10. SIZE AND TYPE OF BIT		
3. DRILLING AGENCY		11. DATUM FOR ELEVATION SHOWN (TBM or MLL)		
4. HOLE NO. (As shown on drawing title and file number)		12. MANUFACTURER'S DESIGNATION OF DRILL		
<i>79-12M</i>		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		
5. NAME OF DRILLER		DISTURBED		
6. DIRECTION OF HOLE		UNDISTURBED		
<input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		14. TOTAL NUMBER CORE BOXES		
7. THICKNESS OF OVERBURDEN		15. ELEVATION GROUND WATER		
8. DEPTH DRILLED INTO ROCK		16. DATE HOLE		
9. TOTAL DEPTH OF HOLE		STARTED		
		COMPLETED		
		17. ELEVATION TOP OF HOLE <i>711.2</i>		
		18. TOTAL CORE RECOVERY FOR BORING		
		19. SIGNATURE OF INSPECTOR		
		<i>K. Harmon</i>		

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
681.2	30.1				2x2 1/2	
681.1	31.1				17	2"x2 1/2" DM VBS 30-33'
	31	SP	LT. BR MED SAND M. JENCE WET	57.10 31.32	27	Sample 10 31'-32' JAN
	32				36	
	33			D-3 R-21	37	DOT 33
	34	SP			38	STD DRIVE 33'-35'
	35				12	
	36				17	(29)
676.6	34.6				20	
	35	SP	LT. BR FINE SAND M. JENCE WET	D-2 R-19	20	DOT 35
	36			57.11 34.6	24	2"x2 1/2" DM VBS 35'-38'
675.3	35.9			34.9	24	Sample 11 34.6-34.9 JAN
675.0	36.2	ML	LAYER SANDY SILT			
	37				48	
	38	SP	LT. BR MED SAND M. JENCE WET SOME GRAVEL	57.12 36.2	54	Sample 12 36.2-37'
	39			37	54	
	40			D-3 R-2.7	54	DOT 38
672.7	38.5				11	STD DRIVE
	39				13	38-40
	40	SP	LT. BR MED TO COARSE SAND M. JENCE WET	57.13 39.40	15	Sample 13 39'-40' JAN
671.2	40				20	DOT 40

Hole No. 79-122

DRILLING LOG		DIVISION		INSTALLATION ST. Paul DISTRICT		SHEET 5 OF SHEETS	
1. PROJECT CHASKA PILE				10. SIZE AND TYPE OF BIT			
2. LOCATION (Coordinates or Station)				11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY				12. MANUFACTURER'S DESIGNATION OF DRILL			
4. HOLE NO. (As shown on drawing title and file number) 79-122				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED	
5. NAME OF DRILLER				14. TOTAL NUMBER CORE BOXES		UNDISTURBED	
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				15. ELEVATION GROUND WATER		16. DATE HOLE	
7. THICKNESS OF OVERBURDEN				17. ELEVATION TOP OF HOLE 711.2		STARTED	
8. DEPTH DRILLED INTO ROCK				18. TOTAL CORE RECOVERY FOR BORING		COMPLETED	
9. TOTAL DEPTH OF HOLE				19. SIGNATURE OF INSPECTOR <i>K. Harrison</i>			

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
671.240			LT. BR		2025	2" x 2 1/4" DR. W. 40'-43'
	41	SP	ME & TO COARSE SAND	5# 14	48	
	42		DENCE WET	41/42	70	Sample 14 41'-42' JAN
	43		SOME GRAVEL		97	
			1" SA ME	D-3 R-2.3	STO 23	BOT 43 STD DRIVE 43'-45'
667.244			LT. BROWN		30	
	45	SP	SANDY GRAVEL		45	
	46		DENCE SATURATED		62	BOT 45
	47		55% GRAVEL	5# 15	105	2" x 2 1/4" DRIVE 45'-48'
			45% COARSE SAND 1/2" SIZE & SMALLER	46/47	110	Sample 15 46'-47' JAN
	48		1" SA ME	D-3 R-2.8	121	BOT 48
	49				STO 19	STD. DRIVE 48'-50'
					26	
					31	
661.250				D-2 R-1.1	59	BOT 50

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.
(TRANSLUCENT)

PROJECT **CHASKA LEVER** HOLE NO. **79-122**
B-11

DRILLING LOG		DIVISION		INSTALLATION		Hole No. 79-12m		SHEET OF 6 SHEETS	
1. PROJECT CHASKA DIKE				10. SIZE AND TYPE OF BIT					
2. LOCATION (Coordinates or Station)				11. DATUM FOR ELEVATION SHOWN (TBM or MSL)					
3. DRILLING AGENCY				12. MANUFACTURER'S DESIGNATION OF DRILL					
4. HOLE NO. (As shown on drawing title and file number) #6 79 12m				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED		UNDISTURBED	
5. NAME OF DRILLER				14. TOTAL NUMBER CORE BOXES					
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				15. ELEVATION GROUND WATER					
7. THICKNESS OF OVERBURDEN				16. DATE HOLE STARTED _____ COMPLETED _____					
8. DEPTH DRILLED INTO ROCK				17. ELEVATION TOP OF HOLE 711.2					
9. TOTAL DEPTH OF HOLE				18. TOTAL CORE RECOVERY FOR BORING _____ %					
				19. SIGNATURE OF INSPECTOR L. Harmon					
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)			
661.2	50				2X2 1/2	2' x 2 1/2" DRIVE			
661.0	50.2				49	50'-53'			
	51	SP	LT. BROWN GRAVELLY SAND DENCE SATURATED		60				
	52		40% GRAVEL 60% COARSE SAND		83				
	53			D-3 R-1.9	STD 14	D.T. 53 STD. DRIVE 53'-55'			
	54			57 1/6 53 54	19	(38) sample #16 53'-54' JAN.			
	55		Bottom of Hole	D-2 R-1.4	21	BOT 55			
						BOT of hole 55'			

ELEVATION 716.6'	DEPTH 10.6	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
716.2'	10.4	SC	Clayey Sand Loose Moist Sub-Ang. - Ang. Disbun Med Sand 30% Fr. Gravel 30% Coarse Sand 15% Clay 10%	2x2 1/2		Set HSA to 10'
715.8'	10.8	SP	Coarse Sand Loose Wet Coarse Sand 70% Med Sand 30% Ang	7		Prove 2x3'
	11					
	12		No Core	16		
				19		
713.6'	13	Appex		D3 2.8'		
713.2'	13.4	SP	Coarse Sand Wet Coarse Sand 65% Loose Brown Med Sand 35%	STD	13.0' 5#6 13.4'	Note 13' 13' 1
	14	CL SC	Sandy Clay Soft Sl. Plastic Wet Sub-Ang. Brown		13.4' 5#7 14.4'	2
	15		Clay 35% Med Sand 25% Fr. Gravel 25% Fr. Sand 15%	D2 2.4'		Note 15' 15' 2
	16					
710.5'	16.1	SC	Clayey Sand Med Dense Sl. Plastic Moist-Wet Sub-Ang. - Ang Greenish Brown		16.1' 5#8 16.9'	
	17					
	18		Med Sand 40% Fr. Sand 30% Coarse Sand 20% Clay 10%	STD		Note 18' 18' 3
	19					
707.2'	19.4		No Core	D2 2.4'		Note 20' 20' 5 7 13

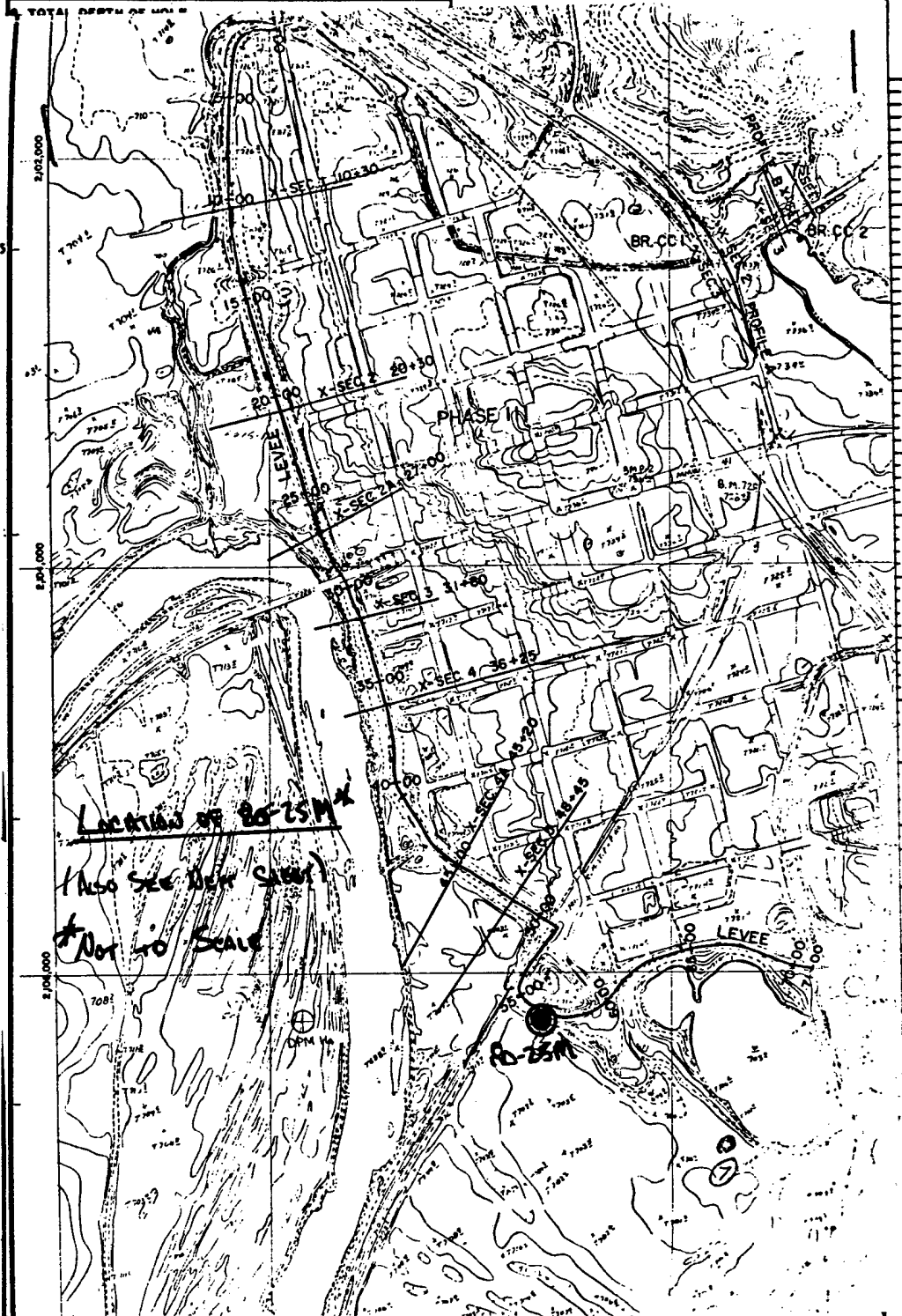
DRILLING LOG		DIVISION		INSTALLATION		SHEET	
1. PROJECT		NCD		St. Paul District		3 OF 7 SHEETS	
2. LOCATION (Coordinates or Station)		Chaska		10. SIZE AND TYPE OF BIT			
3. DRILLING AGENCY		US-EE-C		11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
4. HOLE NO. (As shown on drawing title and file number)		Ref #5 80-25M		12. MANUFACTURER'S DESIGNATION OF DRILL		CME-750	
5. NAME OF DRILLER		Ken Harman		13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED UNDISTURBED	
6. DIRECTION OF HOLE		<input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		14. TOTAL NUMBER CORE BOXES			
7. THICKNESS OF OVERBURDEN				15. ELEVATION GROUND WATER			
8. DEPTH DRILLED INTO ROCK				16. DATE HOLE		STARTED COMPLETED	
9. TOTAL DEPTH OF HOLE				17. ELEVATION TOP OF HOLE		726.6'	
				18. TOTAL CORE RECOVERY FOR BORING		%	
				19. SIGNATURE OF INSPECTOR			

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
706.6'	20'		Fine Sand Loose - Med Dense Moist - Wet SubAng - SubRd Brown Fine Sand 70% Med Sand 15% Fine Gravel 15%		20	Set HSA to 20' Pushed 2x3' with hydraulic
	21'	SP			5#9	
	22'				21.5	
704.5'	22.1'	sharp				
	23'	CL	Sandy Clay Stiff Sh. Plastic Moist - Wet Ang SubAng Brown Clay 35% Med Sand 25% Fine Sand 25% Fine Gravel 15%	D3' R2.4' STD	23.3	Note 23'
	24'				5#10	
	25'				24.2'	
	26'					
	27'					
	28'	typical		D3' R2.4' STD		Note 25'
698.6'	28'					Set HSA to 25' Pushed 2x3' Sounded hole water at 25'
	29'	f	Coarse Sand Dense Wet Sat. SubAng Black Med Sand 30% Fin. Gravel 30% Fin. Sand 10% Coars. Sand 10% Clay 5%	D3' R2.4' STD	29.3	Note 28'
	30'					Set HSA to 29' began using fine mud + 3" Parker bit
	31'					Note 30'

DRILLING LOG		DIVISION	INSTALLATION		SHEET 5 OF 7 SHEETS	
1. PROJECT		NCD	St. Paul District			
2. LOCATION (Coordinates or Station)		Chaska	10. SIZE AND TYPE OF BIT			
3. DRILLING AGENCY		US-CE-C	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
4. HOLE NO. (As shown on drawing title and file number)		Ref #5 8C-2514	12. MANUFACTURER'S DESIGNATION OF DRILL		CME-750	
5. NAME OF DRILLER		Kent Harmon	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED UNDISTURBED	
6. DIRECTION OF HOLE			14. TOTAL NUMBER CORE BOXES			
7. THICKNESS OF OVERBURDEN			15. ELEVATION GROUND WATER			
8. DEPTH DRILLED INTO ROCK			16. DATE HOLE		STARTED COMPLETED	
9. TOTAL DEPTH OF HOLE			17. ELEVATION TOP OF HOLE		726.6'	
			18. TOTAL CORE RECOVERY FOR BORING		%	
			19. SIGNATURE OF INSPECTOR			
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
686.6'	42.6'		Organic Clay Med Stiff - Stiff Plastic Sat. Dk. Gray	50%		Drilled out hole to 46' Pushed in 3' w/ hydraulics
	41'	OH			41.0' 5810	
	42'		Clay 75% Silt 25%		4.9'	
	43'			D3' R-0		Note 43' 43'
	44'			STD		
	45'			D2' R-0		Note 45' 45'
	46'					Drilled out hole to 45' Pushed in 2.3'
	47'	OH				
	48'			D3' R-0		Note 48' 48'
	49'				48.2	
	50'					
	51'					
	52'					
	53'					
	54'					
	55'					
	56'					
	57'					
	58'					
	59'					
	60'					

DRILLING LOG		DIVISION	INSTALLATION		SHEET 6 OF 7 SHEETS	
1. PROJECT Chaska			10. SIZE AND TYPE OF BIT		11. DATUM FOR ELEVATION SHOWN (TBM or BSL)	
2. LOCATION (Coordinates or Station)			12. MANUFACTURER'S DESIGNATION OF DRILL CME-750		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	
3. DRILLING AGENCY US-CE-C			14. TOTAL NUMBER CORE BOXES		15. ELEVATION GROUND WATER	
4. HOLE NO. (As shown on drawing title and file number) Ref #5 80-25M			16. DATE HOLE		17. ELEVATION TOP OF HOLE 726.6'	
5. NAME OF DRILLER Ken Harmon			18. TOTAL CORE RECOVERY FOR BORING		19. SIGNATURE OF INSPECTOR	
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			19. SIGNATURE OF INSPECTOR			
7. THICKNESS OF OVERBURDEN			19. SIGNATURE OF INSPECTOR			
8. DEPTH DRILLED INTO ROCK			19. SIGNATURE OF INSPECTOR			
9. TOTAL DEPTH OF HOLE			19. SIGNATURE OF INSPECTOR			
ELEVATION 676.6'	DEPTH 50'	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	51	CL	Silty Clay Med Stiff Plastic Sat. Greenish Gray Clay 70% S + 30%		501 502 503	Drilled out hole to 50' Pushed 2x2.5' with hydraulics Drive 2 1/2" at 5'
673.8'	52					
	53	ST	Med Sand Med to Coarse V. to H. Sand Gr. to Co. Sand Gr. to Co. Sand	42 DR 3' 510	510 511 512	Note 53' 53'
673.0'	54		Bottom of hole			
	55			02' RG		Note 55' 55'
	56					Pulled casing + filled hole with Sand cement
	57					
	58					
	59					
	60					
	61					
	62					
	63					
	64					
	65					
	66					
	67					
	68					
	69					
	70					
	71					
	72					
	73					
	74					
	75					
	76					
	77					
	78					
	79					
	80					

DRILLING LOG		DIVISION	INSTALLATION	Hole No. 80-25M
1. PROJECT		WCD	St. Paul District	SHEET 7 OF 7 SHEETS
2. LOCATION (Coordinates or Station)		Chaska		
3. DRILLING AGENCY		US-CE-C		
4. HOLE NO. (As shown on drawing title and file number)		Ref #5 80-25M		
5. NAME OF DRILLER		Ken Haimen		
6. DIRECTION OF HOLE		<input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		
7. THICKNESS OF OVERBURDEN		10. SIZE AND TYPE OF BIT		
8. DEPTH DRILLED INTO ROCK		11. DAYUM FOR ELEVATION SHOWN (TBM or ASL)		
9. TOTAL DEPTH OF HOLE		12. MANUFACTURER'S DESIGNATION OF DRILL		
		CME 750		
		13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		
		DISTURBED UNDISTURBED		
		14. TOTAL NUMBER CORE BOXES		
		15. ELEVATION GROUND WATER		
		16. DATE HOLE		
		STARTED COMPLETED		
		17. ELEVATION TOP OF HOLE 726.6'		
		18. TOTAL CORE RECOVERY FOR BORING		
		19. SIGNATURE OF INSPECTOR		



DRILLING LOG		DIVISION		INSTALLATION		SHEET	
1. PROJECT		2. LOCATION (Coordinates or Station)		10. SIZE AND TYPE OF BIT		11. DATUM FOR ELEVATION SHOWN (TBM)	
3. DRILLING AGENCY		4. HOLE NO. (As shown on drawing title and file number)		12. MANUFACTURER'S DESIGNATION OF DRILL		13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN	
5. NAME OF DRILLER		6. DIRECTION OF HOLE		14. TOTAL NUMBER CORE BOXES		15. ELEVATION GROUND WATER	
7. THICKNESS OF OVERBURDEN		8. DEPTH DRILLED INTO ROCK		16. DATE HOLE		17. ELEVATION TOP OF HOLE	
9. TOTAL DEPTH OF HOLE		18. TOTAL CORE RECOVERY FOR BORING		19. SIGNATURE OF INSPECTOR		20. REMARKS	
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SCORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	
718.25	0.0		damp Gravel 100% gravel (GM)	25 1/2		NOTES 1. weight of hammer is 140 lb. with 30" drop 2. Type of sampler indicated top of each drive	
	1.2		Silty Sandy Gravel (GM)	4			
	10.0		Black 50 Gravel moist fine - coarse med dense 25% Sand fine - coarse fill 25% Silt Damp	5 H E O N K L D-30 R-1.7 58 9 50	5# 1.0 115		
	30.0						
	40.0						
	713.25	5.0	Gravelly Sandy Silt (SM)	25 1/2		Note Refusal 3.2. Auger Post 3.7 + 5.0	
	6.0		Block with gray seams 40% Silt moist 35% Sand med dense 25% Gravel sh. plasticity pieces of wood	16		Note Set hollow stem auger to 5.0	
	7.0			25		712.25	
	8.0			17			
	9.0			13			
	709.25	11.0	more pieces of wood	13		Note Set hollow stem to 10.0	

1 DRILLING LOG		DIVISION <i>NUCO</i>		INSTALLATION <i>ST Paul District</i>		Hole No. <i>82-51M</i>		SHEET <i>3</i> OF <i>6</i> SHEETS	
2. PROJECT <i>Chaska</i>				10. SIZE AND TYPE OF BIT					
3. LOCATION (Coordinate or Station)				11. DATUM FOR ELEVATION SHOWN (FBN or MSL)					
4. DRILLING AGENCY				12. MANUFACTURER'S DESIGNATION OF DRILL					
5. HOLE NO. (As shown on drawing title and file number) <i>#14</i>				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED		UNDISTURBED	
6. NAME OF DRILLER				14. TOTAL NUMBER CORE BOXES					
7. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				15. ELEVATION GROUND WATER					
8. THICKNESS OF OVERBURDEN				16. DATE HOLE		STARTED		COMPLETED	
9. DEPTH DRILLED INTO ROCK				17. ELEVATION TOP OF HOLE <i>718.75</i>					
10. TOTAL DEPTH OF HOLE				18. TOTAL CORE RECOVERY FOR BORING					
				19. SIGNATURE OF INSPECTOR					
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)			
<i>708.75</i>	<i>10.0</i>		<i>Gravily Silty Sand (SM)</i>	<i>2x1 1/2</i>					
<i>708.15</i>	<i>10.5</i>		<i>Black 60% sand</i>	<i>4</i>					
	<i>11.0</i>		<i>moist 30% silt</i>		<i>5#3</i>				
<i>707.25</i>	<i>11.5</i>		<i>med dense wood 10% gravel</i>	<i>9</i>	<i>11.0</i>				
	<i>12.0</i>		<i>paper cloth pieces</i>		<i>11.5</i>				
	<i>12.5</i>			<i>7</i>					
<i>705.75</i>	<i>13.0</i>		<i>glass more paper wood</i>	<i>D-30</i>					
	<i>14.0</i>			<i>R-10</i>					
	<i>15.0</i>			<i>Std.</i>	<i>1</i>				
	<i>16.0</i>			<i>1</i>					
	<i>17.0</i>			<i>1</i>					
	<i>18.0</i>			<i>7</i>					
	<i>19.0</i>		<i>Plastic glass</i>	<i>D-20</i>					
	<i>20.0</i>		<i>wet-saturated</i>	<i>E-17</i>					
	<i>21.0</i>			<i>2x1 1/2</i>					
	<i>22.0</i>			<i>P</i>					
	<i>23.0</i>			<i>4</i>					
	<i>24.0</i>			<i>5</i>	<i>5#4</i>				
	<i>25.0</i>			<i>H</i>	<i>160</i>				
	<i>26.0</i>			<i>E</i>	<i>165</i>				
	<i>27.0</i>			<i>O</i>					
	<i>28.0</i>								
	<i>29.0</i>			<i>D-30</i>					
	<i>30.0</i>			<i>R-17</i>					
	<i>31.0</i>			<i>Std.</i>					
	<i>32.0</i>		<i>saturated</i>	<i>3</i>					
	<i>33.0</i>			<i>10</i>					
	<i>34.0</i>			<i>8</i>	<i>6#25</i>				
<i>678.75</i>	<i>20</i>			<i>12</i>					
				<i>D-20</i>					
				<i>R-14</i>					

NOTE

Set Hollow Stem to 15.0

Depth	Time
17.0	4:30 PM
16.9	4:35
16.9	4:45 PM
18.9	7:05 AM 10/16/82

Set Hollow Stem to 20.0

NOTE

Set Hollow Stem to 20.0

End shift 10/16/82

DRILLING LOG		DIVISION NCD		INSTALLATION St. Paul District		Hole No. 82-51M	
1. PROJECT Chaska				10. SIZE AND TYPE OF BIT			
2. LOCATION (Coordinates or Station)				11. DATUM FOR ELEVATION SHOWN (TBM or MEZ)			
3. DRILLING AGENCY				12. MANUFACTURER'S DESIGNATION OF DRILL			
4. HOLE NO. (As shown on drawing title and file number) #14				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		14. TOTAL NUMBER CORE BOXES	
5. NAME OF DRILLER				15. ELEVATION GROUND WATER		16. DATE HOLE	
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				17. ELEVATION TOP OF HOLE		18. TOTAL CORE RECOVERY FOR BORING	
7. THICKNESS OF OVERBURDEN				19. SIGNATURE OF INSPECTOR			
8. DEPTH DRILLED INTO ROCK							
9. TOTAL DEPTH OF HOLE							
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	
698.75	200		Organic oily glass gran. silt/clay 46m (trash)	22.1/2			
	210		Black Smelly - facioil/snell Saturated loose	4	5#5		
	220			5	210		
	230			H	215		
	240			E			
	250			D			
	260			0-30			
	270			R-1.7			
	280			5#			
	290			2			
	300			2			
694.25	275		Organic Sandy silty clay (CL-CH)	3		Note set Hollow stem to 25.0	
	280		Dark gray Wet silty plastic	0-30			
	290		Plant material / shell fragments Swamp deposit	0-30			
	300			P	5#6		
	310			4	260		
	320			5	26.5		
	330			H			
	340			E			
	350			D			
	360			0-30			
	370			R-2.1			
	380			5#			
	390			2			
	400			2			
	410			2			
	420			2			
688.75	300			0-30			
	310			R-3.0			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT **Chaska** HOLE NO. **82-51M**

Gradation Curve
MRD # 83/67
8 Mar 83
LL = 116
PL = 31 PI = 85
class = CH
Note Set Hollow Stem to 300

DRILLING LOG		DIVISION	INSTALLATION	Hole No. 82-51M	
1. PROJECT		NCD		ST Paul District	
2. LOCATION (Coordinate or Station)		CHASKA		SHEET OF 6 SHEETS	
3. DRILLING AGENCY				10. SIZE AND TYPE OF BIT	
4. HOLE NO. (As shown on drawing title and file number)		#14		11. DAY ON FOR ELEVATION SHOWN (TBM or BBL)	
5. NAME OF DRILLER				12. MANUFACTURER'S DESIGNATION OF DRILL	
6. DIRECTION OF HOLE		<input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	
7. THICKNESS OF OVERBURDEN				DISTURBED	
8. DEPTH DRILLED INTO ROCK				UNDISTURBED	
9. TOTAL DEPTH OF HOLE				14. TOTAL NUMBER CORE BOXES	
				15. ELEVATION GROUND WATER	
				16. DATE HOLE	
				STARTED	
				COMPLETED	
				17. ELEVATION TOP OF HOLE	
				18. TOTAL CORE RECOVERY FOR BORING	
				19. SIGNATURE OF INSPECTOR	

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
687.75	28.0		Organic sandy silty clay (OL-CL)	2X2 1/2		
			Dark gray wet plastic med stiff shell fragments plant material Organic	P		
	31.0			4		
				5		
				H	#7	
				E	31.0	687.75
				D	31.5	
	32.0					
	33.0					
				0-30		
				R		
	34.0			54		
				2		
	35.0			3		
				4		687.75
				3		
	35.2			0-30		
				R		
				2X2 1/2		
				P		
	36.0			4		
				5		
				H	#7	
				E	31.0	687.75
				D	31.5	
	37.0					
	38.0			0-30		
				R-3.0		
				54		
				6		
	39.0			6		
				7		679.75
	40.0			7		
				0-30		
				R-3.0		

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.
(TRANSLUCENT)

PROJECT CHASKA HOLE NO. 82-51M

B-23

Hole No. 82-51M

DRILLING LOG		DIVISION	INSTALLATION	SHEET
PROJECT		NCO	St Paul District	5
LOCATION (Coordinate or Station)		CHASKA	OF 6 SHEETS	
DRILLING AGENCY				
HOLE NO. (As shown on drawing title and file number)		# 14	10. SIZE AND TYPE OF BIT	
NAME OF DRILLER			11. DATUM FOR ELEVATION SHOWN (TBM or BM)	
DIRECTION OF HOLE			12. MANUFACTURER'S DESIGNATION OF DRILL	
<input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	
THICKNESS OF OVERBURDEN			DISTURBED	
DEPTH DRILLED INTO ROCK			UNDISTURBED	
TOTAL DEPTH OF HOLE			14. TOTAL NUMBER CORE BOXES	
			15. ELEVATION GROUND WATER	
			16. DATE HOLE	
			STARTED	
			COMPLETED	
			17. ELEVATION TOP OF HOLE	
			718.25	
			18. TOTAL CORE RECOVERY FOR BORING	
			19. SIGNATURE OF INSPECTOR	

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
678.25	40.0		Organic silty clay (CL _{OL})	22 1/2		
			Dark gray Plastic	P		
			Organic Shell & w/ med stiff Plants	4		
677.75	41.0		Sandy silty clay (CL)	5	5#9	
			greenish gray	H	41.0	677.75
			stiff to very stiff	E	41.5	
	42.0		Plastic	D		
			60% clay			
			30% silt			
	43.0		10% sand fine	0-3.0		
				R-3.0		
675.25	43.5		Silt sandy broken gravel (GW)	24		
			Very hard	56	5#10	
	44.0		Saturated		44.0	
			Broken pieces of gravel	43	44.5	
				58		
				0-2.0		
673.75	45.0		End Boring	R-4.5		
	46.0					
	47.2					
	48.0					
	49.2					
668.75	50.0					

NOTE
1. All tools removed
2. Hole cemented

DRILLING LOG		DIVISION <u>NCD</u>		INSTALLATION <u>ST Paul District</u>		Hole No. <u>K2-51M</u>	
1. PROJECT <u>CHASKA</u>		10. SIZE AND TYPE OF BIT		11. DATUM FOR ELEVATION SHOWN (TBM or BM)		SHEET <u>6</u> OF <u>6</u> SHEETS	
2. LOCATION (Coordinates or Station)		12. MANUFACTURER'S DESIGNATION OF DRILL		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED <input type="checkbox"/> UNDISTURBED <input type="checkbox"/>	
3. DRILLING AGENCY		14. TOTAL NUMBER CORE BOXES		15. ELEVATION GROUND WATER		16. DATE HOLE <input type="checkbox"/> STARTED <input type="checkbox"/> COMPLETED	
4. HOLE NO. (As shown on drawing title and file number) <u>#14</u>		17. ELEVATION TOP OF HOLE <u>718.75</u>		18. TOTAL CORE RECOVERY FOR BORING <u>1</u>		19. SIGNATURE OF INSPECTOR	
5. NAME OF DRILLER		6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		7. THICKNESS OF OVERBURDEN		8. DEPTH DRILLED INTO ROCK	
9. TOTAL DEPTH OF HOLE		ELEVATION		DEPTH		LEGEND	
		CLASSIFICATION OF MATERIALS (Description)		% CORE RECOVERY		BOX OR SAMPLE NO.	
		REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)					
		Location diagram not to scale					

DRILLING LOG		DIVISION		INSTALLATION		SHEET	
1. PROJECT Chaska Stage 4		100		6. Paul District		SHEET 11	
2. LOCATION (Coordinates or Station) See drawing, page 11		10. SIZE AND TYPE OF BIT 8" HSA 27" RS		11. DAY FOR ELEVATION SHOWN (750 or 800)			
3. DRILLING AGENCY US-CE-C		12. MANUFACTURER'S DESIGNATION OF DRILL CME-750		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED 21 Jar	
4. HOLE NO. (As shown on drawing title and site number) # 8		14. TOTAL NUMBER CORE BOXES		15. ELEVATION GROUND WATER 698.6		16. DATE HOLE 5/26/89	
5. NAME OF DRILLER Ken Harmon		17. ELEVATION TOP OF HOLE 725.53		18. TOTAL CORE RECOVERY FOR BORING 1		19. SIGNATURE OF INSPECTOR Tom Hingelgren	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		7. THICKNESS OF OVERBURDEN 100.0		8. DEPTH DRILLED INTO ROCK 0.0		9. TOTAL DEPTH OF HOLE 100.0	
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	
725.5	0.0		Fill	2x24			
	1.0	SM	Rubblly, (SM) Gravelly, silty Sand	P		① SPT = 140 lb @ 30" drop	
	2.0		- loose	U			
	3.0		- Dry	S			
	4.0		- Brown	H			
	5.0		50% Fine Sand	E			
	6.0		30% Silt	D			
	7.0		15% Fine gravel	20	SW 1		
	8.0		Concrete bunkers	10	3.0		
	9.0			10	4.0		
	10.0			9		② Clean hole to 10.0' with 3" HSA	
	11.0			9			
	12.0		Fill (SP)	2x24			
	13.0	SM	Gravelly Sand	P			
	14.0		- loose	U			
	15.0		- Dry to moist	S			
	16.0		- Brown	H			
	17.0		85% Very Fine Sand	E			
	18.0		15% Fine, rounded gravel	D			
	19.0			20	SW 2		
	20.0			28	3.0		
	21.0			6	4.0		
	22.0			4			
	23.0			3			
	24.0			6			
	25.0			6			
715.3	10.0			6			

File No. 87-126m

DRILLING LOG		DIVISION NCD		INSTALLATION St. Paul District		SHEET 1 OF 1 SHEETS	
1. PROJECT Chaska				10. SIZE AND TYPE OF BIT			
2. LOCATION (Coordinate or Station)				11. DATUM FOR ELEVATION SHOWN (TBM or BM)			
3. DRILLING AGENCY				12. MANUFACTURER'S DESIGNATION OF DRILL			
4. HOLE NO. (As shown on drawing title and file number)				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED	
5. NAME OF DRILLER				14. TOTAL NUMBER CORE BOXES		UNDISTURBED	
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				15. ELEVATION GROUND WATER			
7. THICKNESS OF OVERBURDEN				16. DATE HOLE		STARTED	
8. DEPTH DRILLED INTO ROCK				17. ELEVATION TOP OF HOLE		COMPLETED	
9. TOTAL DEPTH OF HOLE				18. TOTAL CORE RECOVERY FOR BORING		5	
				19. SIGNATURE OF INSPECTOR <i>Tom Hingler</i>			

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
715.5	10.0	SM	(SP) Gravelly Sand cont.	2x2x2 5		
	11.0		- loose - Dry to moist - Brown	20	SM3	④ Clean hole to 15.0' with 3" HSA
	12.0		85% Very Fine Sand 15% Fine gravel	24	13.5 14.5	
	13.0			D 3.0 R 2.7 T 13.0 SPT 8		
712.2	13.3		Fill (SP)	11		
	14.0		Rubblly, Gravelly Sand	6		
	15.0	SM	- loose - Dry to moist - Brown to Black	5		⑤ Clean hole to 20.0' with 3" HSA
	16.0		70% Very Fine Sand 20% Rounded gravel, Fine and Coarse	P 4 S 5 H 5 E 5 D 5	SM4 18.0 19.0	
	17.0		Concrete Gravel Spent Bank			
	18.0			D 3.0 T 3.0 SPT 3		
	19.0			2		
	20.0	SM		3		
705.4	20.0					

DRILLING LOG		DIVISION		INSTALLATION		Hole No. 89-106M	
1. PROJECT		NCD		St. Paul Dist		SHEET 1 OF 1 SHEETS	
2. LOCATION (Coordinates or Station)		Chaska		10. SIZE AND TYPE OF BIT		11. DAYUM FOR ELEVATION SHOWN (TEN or HUND)	
3. DRILLING AGENCY				12. MANUFACTURER'S DESIGNATION OF DRILL		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	
4. HOLE NO. (As shown on drawing title and file number)				14. TOTAL NUMBER CORE BOXES		15. ELEVATION GROUND WATER	
5. NAME OF DRILLER				16. DATE HOLE		17. ELEVATION TOP OF HOLE	
6. DIRECTION OF HOLE		<input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		18. TOTAL CORE RECOVERY FOR BORING		19. SIGNATURE OF INSPECTOR	
7. THICKNESS OF OVERBURDEN				19. SIGNATURE OF INSPECTOR			
8. DEPTH DRILLED INTO ROCK							
9. TOTAL DEPTH OF HOLE							
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SCORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	
705.5	20.0	SP-5M	Rubbly, Gravelly Sand (SP)	2x2x2			
704.5	21.0		Cont. See previous page.	PUSHED			
	22.0	SP-5M	Sand (SP)				
	23.0		- loose	3			
	24.0		- moist; wet below 23.0'	2			
	25.0		- Brown	2			
	26.0		90% Fine, granular Sand	3			
	27.0		10% Fine, round and angular gravel	2x2x2			
698.6	27.0	SP-5M		PUSHED			
	28.0			2			
697.0	28.5		Color change from brown to gray.	2			
696.5	29.0		flatsplain Clayey Silt (mc)	2			
695.0	30.0	ML	(over)	2			

File No. 89-10644

DRILLING LOG		DIVISION <u>NCD</u>		INSTALLATION <u>St. Paul District</u>		SHEET <u>1</u> OF <u>11</u> SHEETS	
1. PROJECT <u>Chaskey</u>				10. SIZE AND TYPE OF BIT			
2. LOCATION (Coordinates or Station)				11. DAY(S) FOR ELEVATION SHOWN (TBM or BML)			
3. DRILLING AGENCY				12. MANUFACTURER'S DESIGNATION OF DRILL			
4. HOLE NO. (As shown on drawing title and file number)				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED <input type="checkbox"/> UNDISTURBED <input type="checkbox"/>	
5. NAME OF DRILLER				14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				15. ELEVATION GROUND WATER			
7. THICKNESS OF OVERBURDEN				16. DATE HOLE		STARTED _____ COMPLETED _____	
8. DEPTH DRILLED INTO ROCK				17. ELEVATION TOP OF HOLE			
9. TOTAL DEPTH OF HOLE				18. TOTAL CORE RECOVERY FOR BORING			
				19. SIGNATURE OF INSPECTOR <u>Tom H. [Signature]</u>			

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVER- ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
695.5	20.0	ML	<u>Clayey Silt</u> (ML)	2x2x		
	21.0		- Soft	P		
			- Nonplastic	U		
			- wet	S		
			- Black	H		
693.8	31.7		70% Silt	E		(#9) Clean hole to 35.0' with 3" HSA
	32.0		25% Clay	D		
			5% Organics (Twigs, roots)	D 2.0 R 2.0 T 2.0 SPT		
	33.0			4		
			<u>Silty Clay</u> (OL)	3		
	34.0	Ch or	- Soft to med stiff	4		(#10) Clean hole to 40.0' with 3" HSA
			- low plasticity	4		
	35.0		- moist	D 2.0 R 2.0 T 2.0 SPT		
			- Black	2x2x		
	36.0		70% Clay	P		
			15% Silt	U		
	37.0		15% Undecomposed weeds and grasses, twigs, roots.	S		
				H		
	38.0			E		
				D		
	39.0			D 2.0 R 2.2 T 2.2 SPT		
				6		
	40.0			6		
		Ch or		6		
695.5	40.0			6		

Hole No. 89-106M

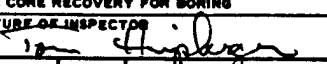
DIVISION		INSTALLATION	
NCD		St. Paul District	
1. PROJECT <u>Chaska</u>		10. SIZE AND TYPE OF BIT	
2. LOCATION (Coordinate or Station)		11. DAYUM FOR ELEVATION SHOWN (FWS or MSL)	
3. DRILLING AGENCY		12. MANUFACTURER'S DESIGNATION OF DRILL	
4. HOLE NO. (As shown on drawing title and file number)		13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN	
5. NAME OF DRILLER		14. TOTAL NUMBER CORE BOXES	
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER	
7. THICKNESS OF OVERBURDEN		16. DATE HOLE STARTED _____ COMPLETED _____	
8. DEPTH DRILLED INTO ROCK		17. ELEVATION TOP OF HOLE	
9. TOTAL DEPTH OF HOLE		18. TOTAL CORE RECOVERY FOR BORING	
		19. SIGNATURE OF INSPECTOR	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
685.5	40.0	Ch	<u>Silty Clay</u> (CL) cont.	2x2x		(14) Clean hole to 45.0' with 2 3/8" Roller Bit - low water loss: ~ 1 gal/min
	41.0		- Soft - low plasticity - moist - Black 70% Clay 15% Silt 15% Organic material	P U S H E D	5410 430 43.6	
680.8	42.7			0 3.0 R 3.0 T 43.0		
	43.0	CL	<u>Sandy, Silty Clay</u> (CL)	SPT 8		
	44.0		- Medium soft to stiff	8		
681.5	44.0		- Slightly plastic	8		
	45.0		- wet	8		
	46.0		- Black	8 2.0 46.0		
	47.0		65% Clay 25% Silt 10% Fine Sand	2x2x 13		
	48.0			26		(15) Clean hole to 50.0' with 2 3/8" Roller Bit. - Water loss = ~ 20 gal/min
	49.0	CP	<u>Sand</u>	31	5411	
	50.0		- loose - wet - grey to brown	0 3.0 R 1.0 T 48.0	480 44.0	
	51.0		90% Fine Sand	SPT 5		
	52.0		10% Fine, rounded gravel	8		
675.5	52.0			9		

DRILLING LOG			DIVISION		INSTALLATION		SHEET	
1. PROJECT			2. LOCATION (Coordinates or Station)		3. DRILLING AGENCY		4. HOLE NO. (As shown on drawing title and file number)	
5. NAME OF DRILLER			6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		7. THICKNESS OF OVERBURDEN		8. DEPTH DRILLED INTO ROCK	
9. TOTAL DEPTH OF HOLE			10. DATE HOLE		11. ELEVATION GROUND WATER		12. SIGNATURE OF INSPECTOR	
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN			14. TOTAL NUMBER CORE BOXES		15. ELEVATION TOP OF HOLE		16. TOTAL CORE RECOVERY FOR BORING	
17. ELEVATION TOP OF HOLE			18. DATE HOLE		19. STARTED		20. COMPLETED	
21. ELEVATION TOP OF HOLE			22. TOTAL CORE RECOVERY FOR BORING		23. SIGNATURE OF INSPECTOR		24. REMARKS	
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SCORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)		
675.5	50.0	SP	Sand (SP) cont. - loose to medium dense - wet - Brown - slightly Calcareous	2x2x2 0 2.0 R 1.5 T 50.0 SPT 12	5410 530 54.0	⑩ Clean hole to 55.0' with 2 3/4" water loss approx. 20 gal/min		
669.3	54.0	SP	Gravelly Sand (SW) - Medium dense - wet - grey to Brown - Calcareous	20 0 2.0 R 2.0 T 50.0 SPT 13	5413 530 54.0	⑪ Thicken drilling mud with Liquid bentonite (T-100), approx. 12 oz. added to previous Bent/H ₂ O ratio.		
665.5	58.0	SW	80% Fine and Medium Sand 20% Fine, round Gravel	13 18 20 24	5413 530 54.0	⑫ Clean hole to 60.0' with 2 3/4" Roller Bit Water loss: ~ 10 gal/min		

DRILLING LOG		DIVISION		INSTALLATION		SHEET	
PROJECT		NCD		St. Paul District		89-106m	
1. LOCATION (Coordinates or Station)		2. DRILLING AGENCY		10. SIZE AND TYPE OF BIT		11. DAYON FOR ELEVATION SHOWN (TBM or BBL)	
3. HOLE NO. (As shown on drawing title and file number)		4. NAME OF DRILLER		12. MANUFACTURER'S DESIGNATION OF DRILL		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	
5. DIRECTION OF HOLE		6. THICKNESS OF OVERBURDEN		14. TOTAL NUMBER CORE BOXES		15. ELEVATION GROUND WATER	
7. TOTAL DEPTH OF HOLE		8. DEPTH DRILLED INTO ROCK		16. DATE HOLE		17. ELEVATION TOP OF HOLE	
9. TOTAL DEPTH OF HOLE		10. SIGNATURE OF INSPECTOR		18. TOTAL CORE RECOVERY FOR BORING		19. SIGNATURE OF INSPECTOR	
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	S CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	
665.5	60.0	SW	Gravelly Sand (sw) cont.	2x2 1/2	33	① Clean hole to 65.0' with 3" HSA - water loss = 10gal/min	
	61.0		- medium dense		50		
	62.0		- wet		56		
	63.0		- Brown		56		
	64.0	SW	80% Fine through Medium Sand	2x2 1/2	12	② Clean hole to 70.0' with 3" HSA. - water loss = 10gal/min	
	65.0		20% Fine, rounded Gravel		18		
	66.0				22		
	67.0				25		
	68.0	SW		2x2 1/2	35		
	69.0				40		
	70.0				46		
	71.0				46		
	72.0			2x2 1/2	12		
	73.0				13		
	74.0				18		
	75.0				18		

Hole No. 89-106m

DRILLING LOG		DIVISION NCD		INSTALLATION St. Paul District		SHEET 2 OF 11 SHEETS	
1. PROJECT Chaska				10. SIZE AND TYPE OF BIT			
2. LOCATION (Coordinate or Station)				11. DATUM FOR ELEVATION SHOWN (TBM or BMS)			
3. DRILLING AGENCY				12. MANUFACTURER'S DESIGNATION OF DRILL			
4. HOLE NO. (As shown on drawing title and file number)				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED	
5. NAME OF DRILLER				14. TOTAL NUMBER CORE BOXES		UNDISTURBED	
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				15. ELEVATION GROUND WATER		16. DATE HOLE	
7. THICKNESS OF OVERBURDEN				17. ELEVATION TOP OF HOLE		STARTED	
8. DEPTH DRILLED INTO ROCK				18. TOTAL CORE RECOVERY FOR BORING		COMPLETED	
9. TOTAL DEPTH OF HOLE				19. SIGNATURE OF INSPECTOR			

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
655.5	70.0	SW	(SW) <u>Gravelly Sand</u> - medium dense	27	2x2x	
	71.0		- wet			
654.2	71.3		- Brown	39		① Clean hole to 75.0' with 2 3/8" Roller Bit
	72.0		- Slightly Calcareous			
	73.0	SP	80% Fine and Medium Sand	35		- Water loss = 10 gal/min
	74.0		20% Fine, round Gravel	9	D 2.0 R 1.5 T 78.0 SPT	
	74.0		<u>Gravelly Sand</u> (SP)	10		
	75.0		- loose to medium dense	11		
	76.0		- wet	14	D 2.0 R 1.5 T 78.0 2x2x	
	77.0		- Brown	36		
	78.0		- Slightly Calcareous	63		② Clean hole to 80.0' with 2 3/8" Roller Bit.
	79.0	SP	80% Fine to med. Sand	75		- Water loss: 10 gal/min
	80.0		20% Fine, round and angular Gravel	15	D 2.0 R 2.0 T 78.0 SPT	
	81.0			20		
	82.0			20		
	83.0			21		
648.8	83.0			22		

B-33

Hole No. **89-126W**

DRILLING LOG		DIVISION NCD	INSTALLATION St. Paul District		SHEET 1 OF 11 SHEETS
1. PROJECT Chaska			10. SIZE AND TYPE OF BIT		
2. LOCATION (Coordinate or Station)			11. DATUM FOR ELEVATION SHOWN (TBM or BM)		
3. DRILLING AGENCY			12. MANUFACTURER'S DESIGNATION OF DRILL		
4. HOLE NO. (As shown on drawing title and file number)			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		13. DISTURBED <input type="checkbox"/> UNDISTURBED <input type="checkbox"/>
5. NAME OF DRILLER			14. TOTAL NUMBER CORE BOXES		
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER		
7. THICKNESS OF OVERBURDEN			16. DATE HOLE		16. STARTED <input type="checkbox"/> COMPLETED <input type="checkbox"/>
8. DEPTH DRILLED INTO ROCK			17. ELEVATION TOP OF HOLE		
9. TOTAL DEPTH OF HOLE			18. TOTAL CORE RECOVERY FOR BORING		
			19. SIGNATURE OF INSPECTOR <i>[Signature]</i>		

ELEVATION <small>a</small>	DEPTH <small>b</small>	LEGEND <small>c</small>	CLASSIFICATION OF MATERIALS (Description) <small>d</small>	SCORE RECOVERY <small>e</small>	BOX OR SAMPLE NO. <small>f</small>	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) <small>g</small>
645.5	80.0	SP	Gravelly Sand (SP)	2x25		
			cont.	42		
644.2	81.3	SP	medium dense	53	SN18	(23) Clean hole to 85.0' with 2 3/8" Roller Bit
			- wet		830	
			- Brown	58	84.0	- water loss = 10 gal/min
			- Slightly Calcareous	SPT 10		
			80% Fine to Med. Sand	11		
			80% Fine, round and angular Gravel	14		
				20		
				39		(24) Clean hole to 90.0' with 2 3/8" Roller Bit
		SP	Sand (SP)	69	SN19	- water loss: 10 gal/min
			- medium dense to dense		81.0	
			- wet	83		
			- Brown	SPT 19		
			- Slightly Calcareous	23		
			- 90% Fine Sand	33		
			5% Coarse sand	33		
			5% silt	33		
635.6	90.0	SP	trace Fine gravel	33		

File No. 89-106m

DRILLING LOG		INSTALLATION	
DIVISION NCD		St. Paul District	
1. PROJECT Chaska		10. SIZE AND TYPE OF BIT	
2. LOCATION (Coordinate or Station)		11. DATUM FOR ELEVATION SHOWN (TEN or MLL)	
3. DRILLING AGENCY		12. MANUFACTURER'S DESIGNATION OF DRILL	
4. HOLE NO. (As shown on drawing title and file number)		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	
5. NAME OF DRILLER		14. TOTAL NUMBER CORE BOXES	
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER	
7. THICKNESS OF OVERBURDEN		16. DATE HOLE STARTED _____ COMPLETED _____	
8. DEPTH DRILLED INTO ROCK		17. ELEVATION TOP OF HOLE	
9. TOTAL DEPTH OF HOLE		18. TOTAL CORE RECOVERY FOR BORING	
		19. SIGNATURE OF INSPECTOR <i>Jan H. Hyslop</i>	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
635.5	90.0	SP	Sand (SP) cont. see previous page.	22 1/2		
	91.0		Gradational Contact (SP)	28		
	92.0		Gravelly Sand	86		
	93.0		- Medium dense	80		
	94.0		- wet	D 3.0 R 2.3 T 93.0		
	95.0		- Brown	SPT 14	5400	
	96.0		- slightly Calcareous	23	93.0 94.0	
	97.0			36		
630.7 630.5	97.8 98.0	SP	80% Medium Sand	52		
			20% Fine, sand gravel	B 2.0 R 2.0 T 98.0		
	99.0	SW	Sand (SP)	59		
	100.0		- dense	106		
	101.0		- wet			
	102.0		- Brown		5481	
	103.0		- Slight Fe stain	84	98.0 99.0	
	104.0		- slightly Calcareous			
	105.0		95% Fine Sand	D 3.0 R 2.2 T 99.0		
	106.0		5% Fine, rounded Gravel	SPT 17		
	107.0	SW	Gravelly Sand (SW)	20		
	108.0		- medium dense			
	109.0		- wet - Brown	21		
625.6	110.0		70% Fine and Med. Gravel 80% Fine, rounded Gravel			
			End of Boring			

DRILLING LOG			DIVISION		INSTALLATION		Hole No. 89-106m	
1. PROJECT Chaska			DIVISION NKD		INSTALLATION St. Paul District		SHEET 11 OF 11 SHEETS	
2. LOCATION (Coordinates or Station)			10. SIZE AND TYPE OF BIT		11. DATUM FOR ELEVATION SHOWN (FEM or MSL)			
3. DRILLING AGENCY			12. MANUFACTURER'S DESIGNATION OF DRILL					
4. HOLE NO. (As shown on drawing title and file number)			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED		UNDISTURBED	
5. NAME OF DRILLER			14. TOTAL NUMBER CORE BOXES					
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER					
7. THICKNESS OF OVERBURDEN			16. DATE HOLE		STARTED		COMPLETED	
8. DEPTH DRILLED INTO ROCK			17. ELEVATION TOP OF HOLE					
9. TOTAL DEPTH OF HOLE			18. TOTAL CORE RECOVERY FOR BORING				%	
			19. SIGNATURE OF INSPECTOR		<i>Thompson</i>			
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g		
625.5	100.0		End of Boring			<div style="text-align: right;"> Courthouse Lake ↑ </div>		

No. 89-110 M

DRILLING LOG		INSTALLATION	
DIVISION NCD		St. Paul District	
1. PROJECT Chaska Stage 4		10. SIZE AND TYPE OF BIT 3" HSA, 2 1/2" RB, 3 1/2" RB	
2. LOCATION (Coordinate or Station) See drawing, page 7		11. DATUM FOR ELEVATION SHOWN (TBM or BM) NGVD 1929 ADT	
3. DRILLING AGENCY US-CE-C		12. MANUFACTURER'S DESIGNATION OF DRILL CME-750	
4. HOLE NO. (As shown on drawing title and site number) 7		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 19 Jar	
5. NAME OF DRILLER Ken Harman		14. TOTAL NUMBER CORE BOXES	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER 687.0	
7. THICKNESS OF OVERBURDEN 60.0		16. DATE HOLE STARTED 6/13/89 COMPLETED 6/13/89	
8. DEPTH DRILLED INTO ROCK 0.0		17. ELEVATION TOP OF HOLE 726.62	
9. TOTAL DEPTH OF HOLE 60.0		18. TOTAL CORE RECOVERY FOR BORING 5	
		19. SIGNATURE OF INSPECTOR Tom Hingler	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
726.6	0.0		<u>Levee Fill</u> (SM)	2x2 1/2		
	1.0	SM	Gravelly, Clayey, Silty Sand	P 4 S H E D		Notes: ① SPT = 140 lbs @ 20" drop
	2.0		- loose			
			- moist			
			- Brown			
			- Calcareous			
			60% Very Fine Sand			
			20% Silt			
			15% Clay			
			5% Fine, rounded and angular Gravel			
	3.0		<u>Silt</u> (ML)	D 3.0 R 2.0 T 3.0 SPT	SH1 1.0 1.8	
	4.0		- stiff	6		
			- non plastic, non elastic			
			- uncemented			
			- moist			
			- Brown			
			- Calcareous			
	4.5		90% Silt	9		
722.1	4.5	ML	5% Very Fine Sand	12		
			5% Clay	D 3.0 R 2.0 T 3.0 SPT	SH2 4.5 5.0	
721.6	5.0		<u>Gravelly, Sandy, Clayey Silt</u> (ML)	2x2 1/2		
	6.0	ML	- medium soft stiff	P 4 S H E D		
			- non plastic, non elastic			
			- uncemented			
			- moist			
			- Brown to gray			
			- Calcareous			
	7.0		60% Silt			
			25% Clay			
			10% Very Fine sand			
			5% Fine, rounded Gravel			
	8.0		<u>Silt</u> (ML)	D 3.0 R 2.0 T 3.0 SPT	SH3 6.5 7.0	
			- medium soft stiff	7		
			- non plastic, non elastic			
			- uncemented			
			- moist			
			- Brown, Calcareous			
	8.6	ML	5% Silt	5		
			5% Clay	5		
718.0	9.0			7		
				7		
716.6	10.0			7		

DRILLING LOG		DIVISION		INSTALLATION		SHEET NO.	
PROJECT		NCO		St. Paul District		69-110	
1. PROJECT		2. LOCATION (Coordinate or Station)		3. DRILLING AGENCY		4. HOLE NO. (As shown on drawing title and file number)	
5. NAME OF DRILLER		6. DIRECTION OF HOLE		7. THICKNESS OF OVERBURDEN		8. DEPTH DRILLED INTO ROCK	
9. TOTAL DEPTH OF HOLE		10. SIZE AND TYPE OF BIT		11. DAYUM FOR ELEVATION BROWN (YES or NO)		12. MANUFACTURER'S DESIGNATION OF DRILL	
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		14. TOTAL NUMBER CORE BOXES		15. ELEVATION GROUND WATER		16. DATE HOLE	
17. ELEVATION TOP OF HOLE		18. TOTAL CORE RECOVERY FOR BORING		19. SIGNATURE OF INSPECTOR		20. REMARKS	
21. SIGNATURE OF DRILLER		22. SIGNATURE OF INSPECTOR		23. SIGNATURE OF DRILLER		24. SIGNATURE OF INSPECTOR	

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
716.6	10.0	CL	(CL) Gravelly, Sandy, Silty, Clay - Soft to medium soft - non plastic - uncemented - moist - Brown-grey - Calcareous 50% Clay 30% Silt 18% Fine Sand 2% Fine, round Gravel	82%		
715.4	11.0			P		
	11.2			4		
	12.0			S		
	13.0	SM	(SM) Gravelly, Silty Sand - loose - uncemented - moist - Brown - Calcareous 60% Fine Sand 30% Silt 10% Fine Gravel	SHED	545	④ Set 3" HSA to 15.0 ft.
	14.0			3	10.2	
	15.0			3	10.6	
	16.0			4		
	17.0			P		
	18.0			4		
	19.0			S		
	20.0			H		
	21.0			E		
	22.0			D		
	23.0				546	
	24.0				16.0	
	25.0				16.8	
	26.0					
	27.0					
	28.0				547	
	29.0				18.4	
	30.0				18.8	
708.2	31.0	CL-ML	(CL-ML) Sandy, Silty Clay - Soft - low plasticity - moist - Brown 50% Clay 30% Silt 20% Fine Sand	82%		⑤ Set 3" HSA to 30.0 ft.
707.8	32.0			3		
	33.0			3		
	34.0			6		
	35.0			10		
706.6	36.0	CL	Gravelly, Sandy Silty Clay * see next page	82%		

DRILLING LOG

PROJECT: Chaska

LOCATION (Coordinates or Station):

DRILLING AGENCY:

HOLE NO. (As shown on drawing title and file number):

NAME OF DRILLER:

DIRECTION OF HOLE:
☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.

THICKNESS OF OVERBURDEN:

DEPTH DRILLED INTO ROCK:

TOTAL DEPTH OF HOLE:

INSTALLATION: St. Paul District

SIZE AND TYPE OF BIT:

DATUM FOR ELEVATION SHOWN (FEET or M.):

MANUFACTURER'S DESIGNATION OF DRILL:

TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: 1 DISTURBED: 1 UNDISTURBED: 1

TOTAL NUMBER CORE BOXES:

ELEVATION GROUND WATER:

DATE HOLE STARTED: _____ COMPLETED: _____

ELEVATION TOP OF HOLE:

TOTAL CORE RECOVERY FOR BORING:

SIGNATURE OF INSPECTOR: Tom Hargrave

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	S CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
706.6	80.0	CL	Gravelly, Sandy Silty Clay (CL) - Medium soft to stiff - non-plastic - uncemented - moist - Brown-grey-black 60% Clay 20% Silt 10% Fine Sand 10% Fine, round Gravel Trace organic material - wood.	2x2x2		
	81.0	SC		P		
	82.0	Test data 110MM		U		
	83.0			S		
	84.0			H		
	85.0			E		
	86.0			D	548 20.9 21.9	⑥ Set 2" HSA to 35.0 ft.
703.2	83.0	CL	Sandy Clay (CL) - medium soft to stiff - low plasticity - uncemented - moist, Calcareous - Brown to grey to black 70% Clay 19% Fine Sand 5% Silt 50% Fine, round Gravel 10% Wood fragments	0 30 R 2.6 T 28.0 SPT 6		
	83.4			6		
	84.0			6		
	85.0			9	549 24.0 24.5	
	86.0			8		
	87.0			R 2.0 T 28.0		
	88.0			2x2x2		
700.6	86.0	DL	Gravelly, Sandy Silt (DL) - Soft to Medium Stiff - low plasticity, low elasticity - uncemented - moist - Brown to Black - Calcareous	P		
	87.0			U		
	88.0			S		
	89.0			H		
	90.0			E		
	91.0			D	540 26.0 26.6	⑦ Set 3" HSA to 30.0 ft.
798.6	28.0	SC	Clayey Sand Seam Brown, wet (SC)	0 80 R 2.6 T 28.0 SPT 4		
798.3	28.3			4		
	29.0		50% Silt 30% Fine Sand 15% Fine, round Gravel 5% Clay	4		
	29.7	DL	Stiff Silt (DL) - stiff, moist, Gray to Black, - slightly silty, clayey - 95% Silt, 5% Organic debris.	4		
646.6	30.0			5	541 28.0 28.6	

ENG FORM 1836
MAR 71

PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT

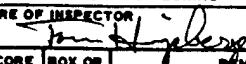
Chaska

HOLE NO.

89-110MM

B-39

DRILLING LOG			DIVISION		INSTALLATION		SHEET	
			NCO		St. Paul District		89-110M	
1. PROJECT			2. LOCATION (Coordinate or Station)		10. SIZE AND TYPE OF BIT		11. DATE FOR ELEVATION SHOWN (TEN or HZ)	
3. DRILLING AGENCY			4. HOLE NO. (As shown on drawing title and file number)		12. MANUFACTURER'S DESIGNATION OF DRILL		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	
5. NAME OF DRILLER			6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		14. TOTAL NUMBER CORE BOXES		15. ELEVATION GROUND WATER	
7. THICKNESS OF OVERBURDEN			8. DEPTH DRILLED INTO ROCK		16. DATE HOLE STARTED		17. ELEVATION TOP OF HOLE	
9. TOTAL DEPTH OF HOLE					18. TOTAL CORE RECOVERY FOR BORING		19. SIGNATURE OF INSPECTOR	
					20. DATE HOLE COMPLETED		21. SIGNATURE OF INSPECTOR	
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SCORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)		
696.6	30.0		contact at 30.0' (OL)	2x22				
	31.0		Clayey Silt	P				
	32.0		- Soft stiff	U				
	33.0		- non-plastic	S				
	34.0		- non-elastic	H				
	35.0		- uncemented	E				
	36.0		- moist to wet	D				
	37.0		- Gray					
	38.0		- Slightly Calcareous					
	39.0		- No odor					
	40.0		70% Silt					
	41.0		25% Clay					
	42.0		5% Organic material, leaves, twigs, rootlets					
	43.0		Gradational Contact					
	44.0		Silty Clay (OL)					
	45.0		- Soft stiff	P				
	46.0		- low plasticity	U				
	47.0		- moist	S				
	48.0		- Gray	H				
	49.0		- Non-calcareous	E				
	50.0		70% Clay					
	51.0		29% Silt					
	52.0		1% Slightly decomposed plant rootlets.					
	53.0							
	54.0							
	55.0							
	56.0							
	57.0							
	58.0							
	59.0							
	60.0							

DRILLING LOG			DIVISION		INSTALLATION		No. 89-110M	
1. PROJECT			NED		St. Paul District		SHEET 5 OF 7 SHEETS	
2. LOCATION (Coordinates or Station)			Chaska		10. SIZE AND TYPE OF BIT		11. DAYUM FOR ELEVATION SHOWN (TBM or BBL)	
3. DRILLING AGENCY					12. MANUFACTURER'S DESIGNATION OF DRILL			
4. HOLE NO. (As shown on drawing title and file number)					13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED UNDISTURBED	
5. NAME OF DRILLER					14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE			<input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER			
7. THICKNESS OF OVERBURDEN					16. DATE HOLE		STARTED COMPLETED	
8. DEPTH DRILLED INTO ROCK					17. ELEVATION TOP OF HOLE			
9. TOTAL DEPTH OF HOLE					18. TOTAL CORE RECOVERY FOR BORING		S	
					19. SIGNATURE OF INSPECTOR			
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	S CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)		
686.6	40.0	OL	Silty Clay (a) - Soft to medium soft - low plasticity - moist - grey - non-calcareous 70% Clay 20% Silt 1% Organic rootlets Trace small, mm-scale white, broken shells.	2.5	SH14 43.5 44.0	(D) Set 3" HSA to 45.0 ft		
	41.0			P				
	42.0			U				
	43.0			S				
	44.0			H				
	45.0		ED	5				
681.6	45.0	OL	Silty Clay (a) - medium soft stiff - low plasticity - moist - Black - Calcareous 60% Clay 35% Silt 1% Feat 1% CaCO ₃ shells	2.5	SH15 45.0 45.0	(D) Set 3" HSA to 50.0 ft.		
	46.0			P				
	47.0			U				
	47.2			S				
	48.0			H				
679.4	47.2		ED	7				
	48.0	OL	Clay (a) - medium soft - low to medium plasticity - moist - black - non calcareous 95% Clay 4% Silt 1% Feat material	2.5	SH16 48.0 50.0			
	49.0			P				
	50.0			U				
	51.0			S				
	52.0			H				
676.6	52.0		ED	7				

DRILLING LOG		DIVISION NCD	INSTALLATION St. Paul District		SHEET 6 of 7 SHEETS
1. PROJECT Chaska			10. SIZE AND TYPE OF BIT		
2. LOCATION (Coordinates or Station)			11. DAYTON FOR ELEVATION SHOWN (TEN or MILL)		
3. DRILLING AGENCY			12. MANUFACTURER'S DESIGNATION OF DRILL		
4. HOLE NO. (As shown on drawing title and file number)			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		
5. NAME OF DRILLER			14. TOTAL NUMBER CORE BOXES		
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER		
7. THICKNESS OF OVERBURDEN			16. DATE HOLE STARTED _____ COMPLETED _____		
8. DEPTH DRILLED INTO ROCK			17. ELEVATION TOP OF HOLE		
9. TOTAL DEPTH OF HOLE			18. TOTAL CORE RECOVERY FOR BORING		
			19. SIGNATURE OF INSPECTOR <i>Tom Hingle</i>		

ELEVATION e	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
676.4	50.0	CL	<u>Clay</u> (CL) - medium soft to stiff - moderate plasticity - moist - light grey - Non-calcareous 95% Clay 5% Silt	2x22	5#17 51.0 51.8	(12) Water level: 11:10 Depth Time 39.2 0 min 39.6 30 min 39.6 120 min
673.0	58.6	SP	<u>Sand</u> (SP) - medium dense - uncemented - saturated - Brown, slightly Calcareous 95% Fine Sand 5% Fine Gravel	9	5#18 54.0 54.8	- Hole open to 46.4 ft. - Drive Sample to 55.0 ft. - Set 3" HSA to 54.0 ft.
670.6	66.0	SP	<u>Gravelly Sand</u> (SP) - medium dense - wet - uncemented - Brown - Calcareous 80% Fine to Medium Sand 20% Fine, rounded Gravel	56	5#19 54.0 54.8	(14) Clean hole to 55.0 ft with 2 7/8" Roller Bit. Water loss: approximately 5 gal/min
666.6	60.0		End of Boring	21		(15) Backfill hole: Pump in grout mix: 40 lbs cement 25 lbs bentonite 30 gals water

DRILLING LOG			DIVISION NCD		INSTALLATION St. Paul District		Hole No. 89-110m	
1. PROJECT Chaska					10. SIZE AND TYPE OF BIT		SHEET 7	
2. LOCATION (Coordinates or Station)					11. DATUM FOR ELEVATION SHOWN (TBM or B.M.)		OF 7 SHEETS	
3. DRILLING AGENCY					12. MANUFACTURER'S DESIGNATION OF DRILL			
4. HOLE NO. (As shown on drawing title and file number)					13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED UNDISTURBED	
5. NAME OF DRILLER					14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED DEG. FROM VERT.					15. ELEVATION GROUND WATER			
7. THICKNESS OF OVERBURDEN					16. DATE HOLE		STARTED COMPLETED	
8. DEPTH DRILLED INTO ROCK					17. ELEVATION TOP OF HOLE			
9. TOTAL DEPTH OF HOLE					18. TOTAL CORE RECOVERY FOR BORING			
					19. SIGNATURE OF INSPECTOR <i>[Signature]</i>			
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)		
			<p>Location</p>					

DIVISION				INSTALLATION	
BRILLING LOG				St. Paul District	
1. PROJECT Chaska Stage 3 Hwy 41 & East Ck				10. SIZE AND TYPE OF BIT 8" HSA 2 1/2" RQ 0.04 SPT	
2. LOCATION (Coordinate or Station) See drawing, page 7				11. DAYUM FOR ELEVATION SHOWN (FEET or METERS) NGVD 1929 ADT	
3. DRILLING AGENCY MS-CE-C				12. MANUFACTURER'S DESIGNATION OF DRILL CME-750	
4. HOLE NO. (As shown on drawing title and file number) #6				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN DISTURBED 13 Jar UNDISTURBED	
5. NAME OF DRILLER Ken Harmon				14. TOTAL NUMBER CORE BOXES	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				15. ELEVATION GROUND WATER 701.5 ft.	
7. THICKNESS OF OVERBURDEN 60.0 ft				16. DATE HOLE STARTED 6/14/89 COMPLETED 6/15/89	
8. DEPTH DRILLED INTO ROCK 0.0 ft				17. ELEVATION TOP OF HOLE 722.20 ft	
9. TOTAL DEPTH OF HOLE 60.0 ft				18. TOTAL CORE RECOVERY FOR BORING %	
				19. SIGNATURE OF INSPECTOR Tom Hupley	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
722.2	0.0		Fill (sm) <u>Gravelly Silty Sand</u> - loose to med. dense - moist to slightly wet - Brown - blk at ic, buff - Calcareous 60% Fine to medium Sand 20% Silt 20% Fine to coarse Gravel Trace pieces of wood	2002		Notes: ① SPT = 140 lb C 20" drop ② Set 8" HSA to 50 ft
	1.0			P		
	2.0			U		
	3.0			S		
	4.0			L		
	5.0			E		
	6.0			D		
	7.0					
	8.0					
	9.0					
	10.0					
	11.0					
	12.0					
	13.0					
	14.0					
	15.0					
	16.0					
	17.0					
	18.0					
	19.0					
	20.0					
	21.0					
	22.0					
	23.0					
	24.0					
	25.0					
	26.0					
	27.0					
	28.0					
	29.0					
	30.0					
	31.0					
	32.0					
	33.0					
	34.0					
	35.0					
	36.0					
	37.0					
	38.0					
	39.0					
	40.0					
	41.0					
	42.0					
	43.0					
	44.0					
	45.0					
	46.0					
	47.0					
	48.0					
	49.0					
	50.0					
	51.0					
	52.0					
	53.0					
	54.0					
	55.0					
	56.0					
	57.0					
	58.0					
	59.0					
	60.0					
718.2	120.0		(Over)			

DRILLING LOG			DIVISION NED	INSTALLATION St. Paul District		SHEET 5 OF 7 SHEETS
1. PROJECT <u>Chaska</u>				10. SIZE AND TYPE OF BIT		
2. LOCATION (Coordinates or Station)				11. DATUM FOR ELEVATION SHOWN (TBM or BM)		
3. DRILLING AGENCY				12. MANUFACTURER'S DESIGNATION OF DRILL		
4. HOLE NO. (As shown on drawing title and file number)				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		
5. NAME OF DRILLER				14. TOTAL NUMBER CORE BOXES		
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				15. ELEVATION GROUND WATER		
7. THICKNESS OF OVERBURDEN				16. DATE HOLE		
8. DEPTH DRILLED INTO ROCK				17. ELEVATION TOP OF HOLE		
9. TOTAL DEPTH OF HOLE				18. TOTAL CORE RECOVERY FOR BORING		
				19. SIGNATURE OF INSPECTOR <u>Tom Hupler</u>		

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
712.2	10.0	SW-SM	Fill Gravelly, Rubbly, Silty Sand cont.	2x2 1/2	PUSHED	④ Set 3" HSA to 15.0 ft
	11.0		- loose			
	12.0		- moist to wet			
	13.0		- Dark brown - black - white - buff colored			
	14.0		50% Fine Sand	3.0 1.1 13.0		
	15.0		50% Silt	SPT 2		
	16.0		consisting of organic material, pieces of wood, etc.	2		
	17.0		15% Fine to Coarse Gravel	3		
	18.0			5 8.0 1.3 15.0		
	19.0			2x2 1/2		
706.2	160	SM	Fill (SM) Gravelly, Silty Sand	PUSHED	PUSHED	⑤ Set 3" HSA to 80.0 ft.
	170		- loose			
	180		- moist			
	190		- black to grey to brown			
	200		- slightly Calcareous			
	210		60% Fine to Very Fine Sand	3.0 2.0 13.0		
	220		20% Silt	SPT 23		
	230		20% Fine to Coarse Gravel	8		
	240		Trace etc. and organic material (wood)	4		
	250			4 8.0 1.3 13.0		

DRILLING LOG			DIVISION NCD		INSTALLATION St. Paul District		No. 37-111M SHEET 3 OF 7 SHEETS															
1. PROJECT Chaska					10. SIZE AND TYPE OF BIT																	
2. LOCATION (Coordinates or Station)					11. DATUM FOR ELEVATION SHOWN (BM or MLL)																	
3. DRILLING AGENCY					12. MANUFACTURER'S DESIGNATION OF DRILL																	
4. HOLE NO. (As shown on drawing title and file number)					13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED UNDISTURBED															
5. NAME OF DRILLER					14. TOTAL NUMBER CORE BOXES																	
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.					15. ELEVATION GROUND WATER		16. DATE HOLE STARTED COMPLETED															
7. THICKNESS OF OVERBURDEN					17. ELEVATION TOP OF HOLE																	
8. DEPTH DRILLED INTO ROCK					18. TOTAL CORE RECOVERY FOR BORING																	
9. TOTAL DEPTH OF HOLE					19. SIGNATURE OF INSPECTOR Tom Hiplinger																	
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g																
702.8	20.0	SM	Fill Gradational Gravelly, Silty Sand	2 x 2 1/2		⑥ Set 3" HSA to 25 ft. ⑦ Water level: 2:30 <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Depth</th> <th>Time</th> </tr> </thead> <tbody> <tr><td>23.9</td><td>0 min</td></tr> <tr><td>22.6</td><td>1 hr</td></tr> <tr><td>22.5</td><td>25 min</td></tr> <tr><td>22.3</td><td>1.5 hrs.</td></tr> <tr><td>21.9</td><td>2 hrs</td></tr> <tr><td>20.7</td><td>17 hrs</td></tr> </tbody> </table> Hole open to 25.3 ft Drive Sample to 30.0 ft Set 3" HSA to 29.0 ft. ⑧ Mix drilling Mud 90 gal water 15 lb Bentonite 12 oz "T100" additive ⑨ Clean hole to 30.0' with 2 1/2" Roller Bit No water loss info.			Depth	Time	23.9	0 min	22.6	1 hr	22.5	25 min	22.3	1.5 hrs.	21.9	2 hrs	20.7	17 hrs
Depth	Time																					
23.9	0 min																					
22.6	1 hr																					
22.5	25 min																					
22.3	1.5 hrs.																					
21.9	2 hrs																					
20.7	17 hrs																					
701.5	20.7		- loose																			
	21.0		- moist																			
			- Black to brown to grey																			
			- Slightly Calcareous																			
		SM	60% Fine to Very-Fine Sand	D 3.0 R 0.2 T 23.0																		
			20% Silt	SPT																		
			10% Fine to Coarse gravel	1																		
			10% Organic debris	2																		
699.2	28.0	SM	Fill (SM) Rubby, Silty Sand	1																		
			- loose	6																		
			- wet to saturated	R 38 T 22.0																		
			- black	2 x 2 1/2																		
			- no odor, but	28																		
			- slightly Calcareous																			
			60% Fine Sand	9																		
			30% Silt																			
			- Rubby, Boulders, wood fragments	11																		
			Silty Clay (CL)	D 3.0 R 1.0 T 23.0																		
			- sat med stiff	SPT																		
			- non-plastic, non elastic	3																		
			- un cemented, moist to wet, Gray, organic odor,	2																		
			- Non calcareous	3																		
698.7	29.6		70% Clay																			
698.8	30.0	CL	80% Silt																			

DIVISION		INSTALLATION		SHEET 4	
DRILLING LOG		St. Paul District		OF 7 SHEETS	
1. PROJECT		10. SIZE AND TYPE OF BIT		11. DAYTON FOR ELEVATION SHOWN (TBM or BBL)	
2. LOCATION (Coordinate or Station)		12. MANUFACTURER'S DESIGNATION OF DRILL		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	
3. DRILLING AGENCY		14. TOTAL NUMBER CORE BOXES		15. ELEVATION GROUND WATER	
4. HOLE NO. (As shown on drawing title and its number)		16. DATE HOLE		17. ELEVATION TOP OF HOLE	
5. NAME OF DRILLER		18. TOTAL CORE RECOVERY FOR BORING		19. SIGNATURE OF INSPECTOR	
6. DIRECTION OF HOLE		19. SIGNATURE OF INSPECTOR		20. SIGNATURE OF INSPECTOR	
7. THICKNESS OF OVERBURDEN		20. SIGNATURE OF INSPECTOR		21. SIGNATURE OF INSPECTOR	
8. DEPTH DRILLED INTO ROCK		21. SIGNATURE OF INSPECTOR		22. SIGNATURE OF INSPECTOR	
9. TOTAL DEPTH OF HOLE		22. SIGNATURE OF INSPECTOR		23. SIGNATURE OF INSPECTOR	
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.
698.2	30.0	CL	Silty Clay (CL) cont.	22%	
	31.0		- Soft	P	
	32.0		- Nonplastic	U	
	33.0		- uncemented	S	
	34.0		- moist to wet	H	
	35.0		- Grey	E	
	36.0		- Non calcareous	D	
	37.0		- Organic odor		
	38.0		70% Clay		
	39.0		30% Silt		
	40.0		Contact between 30.0 & 33.0		
697.8	33.0	CL	Organic Clay (OH)	30.0	
	34.0	OH	- soft med stiff	20.0	
	35.0		- moderate plasticity	33.0	
	36.0		- moist to wet		
	37.0		- Black to dark grey		
	38.0		- Non calcareous		
	39.0		85% Clay		
	40.0		15% Undecomposed plant fibers		
	41.0				
	42.0				
	43.0				
	44.0				
	45.0				
	46.0				
	47.0				
	48.0				
	49.0				
	50.0				
	51.0				
	52.0				
	53.0				
	54.0				
	55.0				
	56.0				
	57.0				
	58.0				
	59.0				
	60.0				
	61.0				
	62.0				
	63.0				
	64.0				
	65.0				
	66.0				
	67.0				
	68.0				
	69.0				
	70.0				
	71.0				
	72.0				
	73.0				
	74.0				
	75.0				
	76.0				
	77.0				
	78.0				
	79.0				
	80.0				
	81.0				
	82.0				
	83.0				
	84.0				
	85.0				
	86.0				
	87.0				
	88.0				
	89.0				
	90.0				
	91.0				
	92.0				
	93.0				
	94.0				
	95.0				
	96.0				

DRILLING LOG			DIVISION		INSTALLATION		SHEET	
1. PROJECT			NCO		St. Paul District		82-111M	
2. LOCATION (Coordinates or Station)			Chaska		10. SIZE AND TYPE OF BIT		SHEET 2 OF 2 SHEETS	
3. DRILLING AGENCY					11. DAYUM FOR ELEVATION SHOWN (FEET or M)			
4. HOLE NO. (As shown on drawing title and file number)					12. MANUFACTURER'S DESIGNATION OF DRILL			
5. NAME OF DRILLER					13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED UNDISTURBED	
6. DIRECTION OF HOLE			<input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		14. TOTAL NUMBER CORE BOXES			
7. THICKNESS OF OVERBURDEN					15. ELEVATION GROUND WATER			
8. DEPTH DRILLED INTO ROCK					16. DATE HOLE		STARTED COMPLETED	
9. TOTAL DEPTH OF HOLE					17. ELEVATION TOP OF HOLE			
					18. TOTAL CORE RECOVERY FOR BORING		S	
					19. SIGNATURE OF INSPECTOR		Tom Hiplerger	

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
a	b	c	d	e	f	g
688.2	40.0	OH	Organic Clay (OH) * See previous description Approximate Contact	22%	PUSHED	
681.7	40.5					
	41.0					
	42.0					
	43.0					
	44.0	SPSM	Sand (SP-SM) - loose - uncemented - saturated - light grey - brown - Slightly Calcareous 89% Fine to Medium Sand 10% Silt 1% Fine Gravel	27	SWID 430 44.0	(14) Clean hole to 45.0 ft with 2 3/8" Roller Bit Water loss: approx. 1 gal/min
	45.0	24				
	46.0	30 R 0.9 T 43.0				
	47.0	SPT 2				
	48.0	3				
	49.0			7		
677.2	50.0	SM	Approximate Contact Silty Sand (SM) - medium dense - wet to saturated - uncemented - light grey to brown - Calcareous 80% Fine Sand 20% Silt	22%	74	(15) Note poor recoveries between 40.0' and 50.0'. Reasons unknown. New baskets installed each drive. (16) Clean hole to 50.0 ft with 2 3/8" Roller Bit Water loss: approx. 1 gal/min
	51.0			78		
	52.0			60		
	53.0			D 30 R 0.0 T 48.0		
	54.0			SPT 25		
	55.0			25	SWII 480 49.0	
	56.0			28		
	57.0			33		
678.2	58.0	SM				

File No. 89-111M

DRILLING LOG		DIVISION	INSTALLATION	SHEET
1. PROJECT <u>Chaska</u>		NED	<u>Chaska</u>	OF 7 SHEETS
2. LOCATION (Coordinates or Station)		10. SIZE AND TYPE OF BIT		
3. DRILLING AGENCY		11. DAYUM FOR ELEVATION SHOWN (ITEM or H.M.)		
4. HOLE NO. (As shown on drawing title and file number)		12. MANUFACTURER'S DESIGNATION OF DRILL		
5. NAME OF DRILLER		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		14. TOTAL NUMBER CORE BOXES		
7. THICKNESS OF OVERBURDEN		15. ELEVATION GROUND WATER		
8. DEPTH DRILLED INTO ROCK		16. DATE HOLE		
9. TOTAL DEPTH OF HOLE		17. ELEVATION TOP OF HOLE		
		18. TOTAL CORE RECOVERY FOR BORING		
		19. SIGNATURE OF INSPECTOR		

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	S CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
672.2	50.0	SM	(SM) <u>Silty Sand</u> cont. - medium dense - uncemented - wet to saturated - light-grey to brown 80% Fine Sand 20% Silt Color change to brown	2x2 1/2 40		(17) Clean hole to 650' with 2 3/8" Roller Bit - Water loss: Approx 3 gal/min - No water loss 100%
	51.0			48		
	52.0			50	SH#2 340 550	
	53.0			5PT 11		
668.4	53.8			12		
	54.0	SW	(SW) <u>Gravelly Sand</u> - medium dense - uncemented - wet - brown - Calcareous 80% Fine through Coarse Sand 15% Fine, rounded Gravel 5% Silt	15		(18) Backfill hole: - Pump in grout mix: 50 gals. water 20 lbs. bentonite 180 lbs cement
	55.0			18		
	56.0			28		
	57.0			50		
665.0	57.2			50		
	58.0	SW	(SW) <u>Gravelly Sand</u> - medium dense - uncemented - wet - brown - Calcareous 70% Fine through Coarse Sand 30% Fine, rounded Gravel	0 2.0 R 3.0 T 58.0 SPT 15	SH#3 585 890	
	59.0			20		
	60.0			25		
662.2	60.0			31		

DRILLING LOG			DIVISION	INSTALLATION		Hole No. 89-111M	
1. PROJECT			NCO	St. Paul District		SHEET 7 OF 7 SHEETS	
2. LOCATION (Coordinate or Station)			Chaska		10. SIZE AND TYPE OF BIT		
3. DRILLING AGENCY			11. DATUM FOR ELEVATION SHOWN (TBM or BBL)				
4. HOLE NO. (As shown on drawing title and file number)			12. MANUFACTURER'S DESIGNATION OF DRILL				
5. NAME OF DRILLER			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN				
6. DIRECTION OF HOLE			14. TOTAL NUMBER CORE BOXES				
7. THICKNESS OF OVERBURDEN			15. ELEVATION GROUND WATER				
8. DEPTH DRILLED INTO ROCK			16. DATE HOLE				
9. TOTAL DEPTH OF HOLE			17. ELEVATION TOP OF HOLE				
			18. TOTAL CORE RECOVERY FOR BORING				
			19. SIGNATURE OF INSPECTOR				
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	
662.3	60.0		End of Boring				
			Location:				
			Waste treatment plant.				
			Dike				
			City Storage area				
			Courthouse lake				
			N				
			89-111 M				

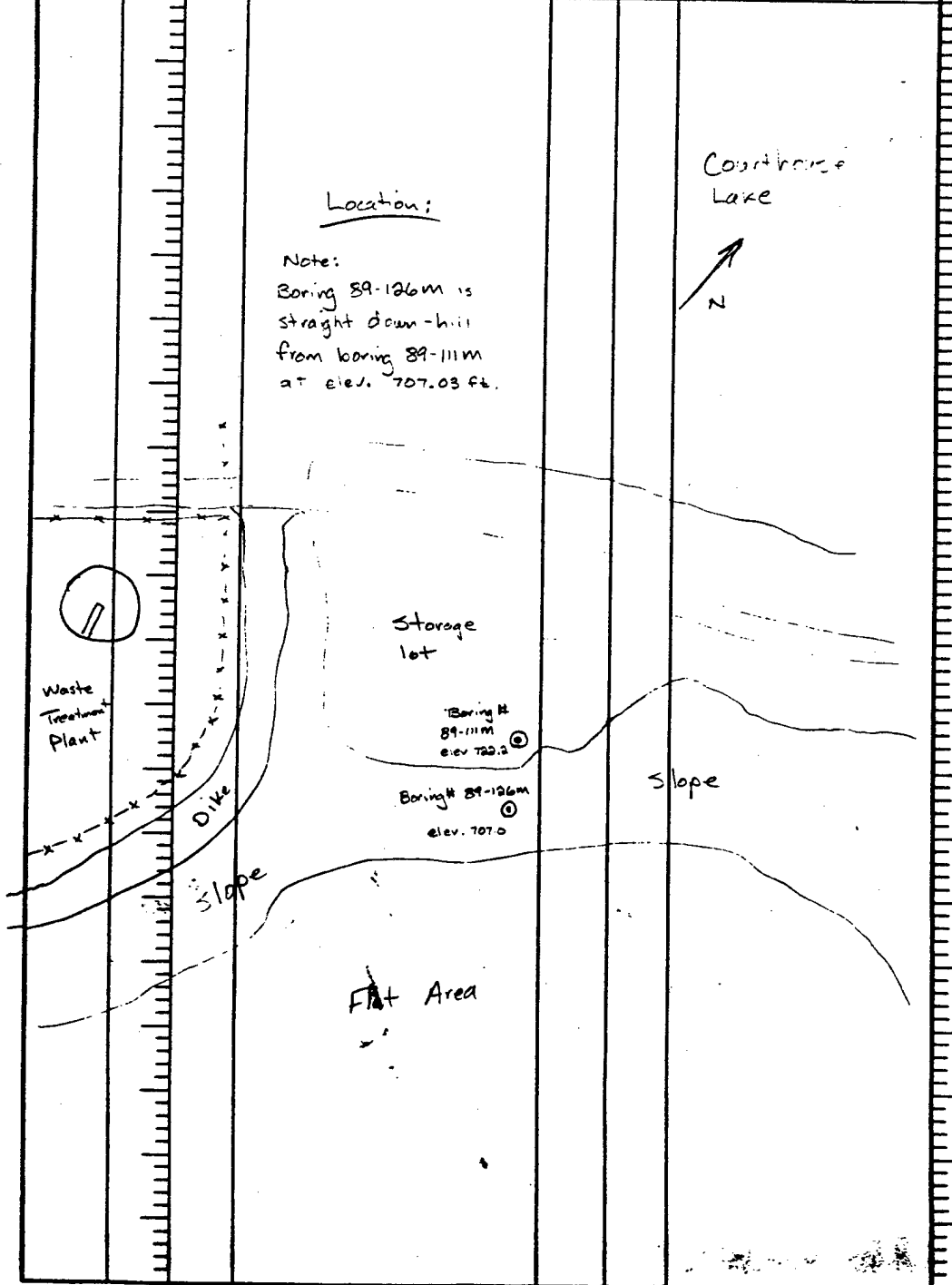
DRILLING LOG		INSTALLATION	
1. PROJECT: <u>Chaska</u>		2. SIZE AND TYPE OF BIT: <u>3" HSA, 2 1/2" E.S. 2 1/2" SPT</u>	
2. LOCATION (Coordinate or Station): <u>See drawing, page 4</u>		11. DATE FOR ELEVATION SHOWN (FEB 2 1989)	
3. DRILLING AGENCY: <u>US-CE-C</u>		12. MANUFACTURER'S DESIGNATION OF DRILL: <u>NBVD 1989 ADT</u>	
4. HOLE NO. (As shown on drawing title and file number): <u>#6 (second #6)</u>		13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: <u>9 Jar</u>	
5. NAME OF DRILLER: <u>Ken Herman</u>		14. TOTAL NUMBER CORE BOXES: <u>701.2</u>	
6. DIRECTION OF HOLE: <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER: <u>701.2</u>	
7. THICKNESS OF OVERBURDEN: <u>20.0 ft.</u>		16. DATE HOLE: <u>7/26/89</u> STARTED <u>7/26/89</u> COMPLETED	
8. DEPTH DRILLED INTO ROCK: <u>0.0 ft.</u>		17. ELEVATION TOP OF HOLE: <u>707.03</u>	
9. TOTAL DEPTH OF HOLE: <u>30.0 ft.</u>		18. TOTAL CORE RECOVERY FOR BORING: <u>3</u>	
		19. SIGNATURE OF INSPECTOR: <u>Tom Hingler</u>	

ELEVATION e	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	1 CORE RECOV. ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
707.0	0.0		Fill (sm) Rubbly, Clayey Silty Sand - loose - moist - brown to black - calcareous	2x2 1/2		Notes:
705.2	1.8	sm	45% Fine Sand 25% Silt 15% Clay 25% Rubble - 1/4" to 1/2" pieces of wood and organic debris	P U S H E D	SM1 0.3 1.5	C SPT = 140 cc @ 30" deep
	3.0	sm	Fill (sm) Silty Sand - loose - calcareous - moist - brown 70% Fine Sand 30% Silt	D 3.0 R 2.8 T 3.0 SPT 3	SM2 3.0 4.0	② Set 3' HSA to 5.0
702.4	4.6	CH		2		
702.2	4.8	sm		1		
702.0	5.0	SC	Clay (CH) - very soft - moderate to high plasticity - wet - green, calcareous	D 2.0 R 2.0 T 3.0 2x2 1/2	SM3 4.6 4.8	③ Water level: 8:00
701.2	5.8		100% Clay (Sample contains some sand) Gravelly Silty Sand (sm) - loose, wet, dark-brown - calcareous 70% Fine to med. Sand 20% Silt 10% Fine, rounded Gravel	P U S H E D	SM4 4.8 5.0	- Hole open to 6.6 ft. - Drive Sample to 9.4 ft. - Set HSA to 9.0' - mix drilling mud: - 40 gal water - 30 lbs bentonite - 12 oz T-100
	7.0	SC	Fill (sc) Rubbly, Silty Clayey Sand - loose - saturated - orange to white - calcareous	D 3.0 R 0.7 T 8.0 SPT 16	SM5 5.0 5.7	④ Clean hole to 10.0' with 2 1/2" Roller Bit - No water loss in fo. - Good water return
	8.0		45% Fine to Medium Sand 30% Clay 10% Silt	21		Note: Small piece of rock recovered in standard Barrel.
697.6	24	Drill		187 R 1.2 T 2.2 SPT 67		

DRILLING LOG		DIVISION NCD		INSTALLATION St. Paul District		SHEET 2 OF 4 SHEETS	
1. PROJECT Chaska				10. SIZE AND TYPE OF BIT 2x2 1/2			
2. LOCATION (Coordinates or Station)				11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY				12. MANUFACTURER'S DESIGNATION OF DRILL			
4. HOLE NO. (As shown on drawing title and file number)				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED UNDISTURBED	
5. NAME OF DRILLER				14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				15. ELEVATION GROUND WATER		16. DATE HOLE STARTED COMPLETED	
7. THICKNESS OF OVERBURDEN				17. ELEVATION TOP OF HOLE			
8. DEPTH DRILLED INTO ROCK				18. TOTAL CORE RECOVERY FOR BORING			
9. TOTAL DEPTH OF HOLE				19. SIGNATURE OF INSPECTOR Tom Hurlinger			
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	
697.0	10.0		Rubblly silty clayey Sand (SC) See previous description Contact between 8.0 ft and 10.0 ft.	2x2 1/2		③ Pe-set 3" HCB to 14.0 ft.	
	11.0	OH	floodplain Silty Clay (OH) - less soft to soft - moderate plasticity - wet - black - calcareous - contains traces of broken, white carbonate shells, mm-scale - also contains semi-decomposed plant roots	P U S H E D	5#6 13.5 14.5	② Clean hole to 15.0 ft. with 2 3/8" Roller Bit - Water loss: 1 gal/min	
	12.0			0 3.0 R 3.0 T 13.0			
	13.0	CH		SPT 1			
	14.0			0			
	15.0	OH	70% Clay 30% Silt	1 0 3.0 R 15.0 T 15.0		⑦ Clean hole to 20.0' with 2 3/8" Roller Bit - water loss: 1 gal/min	
	16.0			2x2 1/2			
	17.0			P U S H E D	SPT 18.5 19.5		
	18.0		- broken shell material disappears below 17.5 ft.	0 3.0 R 18.0 T 18.0			
	19.0			SPT 1			
	20.0	OH		1			
697.0	20.0			1 0 3.0 R 20.0 T 20.0			

DRILLING LOG		DIVISION NCO		INSTALLATION St. Paul District		SHEET 11 OF 4 SHEETS	
1. PROJECT Chaska				10. SIZE AND TYPE OF BIT			
2. LOCATION (Coordinates or Station)				11. DAYUM FOR ELEVATION SHOWN (TEAM or MSL)			
3. DRILLING AGENCY				12. MANUFACTURER'S DESIGNATION OF DRILL			
4. HOLE NO. (As shown on drawing title and file number)				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED	
5. NAME OF DRILLER				14. TOTAL NUMBER CORE BOXES		UNDISTURBED	
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				15. ELEVATION GROUND WATER			
7. THICKNESS OF OVERBURDEN				16. DATE HOLE		STARTED	
8. DEPTH DRILLED INTO ROCK				17. ELEVATION TOP OF HOLE		COMPLETED	
9. TOTAL DEPTH OF HOLE				18. TOTAL CORE RECOVERY FOR BORING		%	
				19. SIGNATURE OF INSPECTOR <i>John H. Hoyer</i>			

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
----------------	------------	-------------	---	-------------------------	------------------------------	---



ELEVATION 725.3	DEPTH 0.0	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	1 CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			#11 Silty Clay (CL) - U. Soft - M. Plasticity - Wet - Saturated - White - Gray - Some organic layers (Fick) - Strong Reaction To Acid (Colorless) - Best Process: Residue Layered (Lucasburg) 70% Clay 20% Silt 10% Organic	2x2 1/2 P U S H D 3.0 R 2.2 T 3.0 SPT I O O O 2x2 1/2 P U S H D 3.0 R 2.0 T 2.0 SPT wt O O Tools O O D 3.0 R 2.0 T 2.0	1 SN1 3.0' 5.0' SN2 8.0' 10.0'	SPT = 140 lbs @ 30' Drop HSA = 4" J.D. Hollow Stem Auger W/RE = With 3/8" Roll-in Bit Being done in Lime pile Near Sugar plant Lime source is from processing - Set HSA to 5.0' - Set HSA to 10.0'

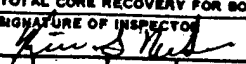
DRILLING LOG		DIVISION		INSTALLATION		Hole No. 92-11721A	
PROJECT		NCD		NCS		SHEET 2	
Chaska - Stage 3						OF 1 SHEETS	
1. LOCATION (Coordinates or Station)				10. SIZE AND TYPE OF BIT		11. DATUM FOR ELEVATION BROWN (TBM or BBL)	
2. DRILLING AGENCY				12. MANUFACTURER'S DESIGNATION OF DRILL			
3. HOLE NO. (As shown on drawing title and site number)				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED UNDISTURBED	
4. NAME OF DRILLER				14. TOTAL NUMBER CORE BOXES			
5. DIRECTION OF HOLE				15. ELEVATION GROUND WATER			
<input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				16. DATE HOLE		STARTED COMPLETED	
7. THICKNESS OF OVERBURDEN				17. ELEVATION TOP OF HOLE			
8. DEPTH DRILLED INTO ROCK				18. TOTAL CORE RECOVERY FOR BORING			
9. TOTAL DEPTH OF HOLE				19. SIGNATURE OF INSPECTOR			
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SCORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	
715.3	10.0		Fill Silty Clay Cont (CL)	2x2 1/2			
			- V. Soft	P			
			- M. Plasticity	U			
			- Wet-saturated				
			- Gray w/ some black				
			- Strong Reaction				
			- 1/2 Acid (Calcium)				
			- Occasional Root System				
			79% Clay	H			
			20% Silty				
			1% organic				
	11.0	CL					
	12.0						
	13.0						
	14.0						
	15.0						
	16.0						
	17.0						
	18.0	CL					
	19.0						
	20.0						
705.3	20.0						

DILLING LOG		DIVISION NCDOS	INSTALLATION NWCS	SHEET NO. OF 16 SHEETS NO. 4-2-1127V
TITLE Chaska - Stages			N. SIZE AND TYPE OF BIT	
LOCATION (Coordinates or Station)			ELEVATION FOR ELEVATION SHOWN (TBM OR BBL.)	
DRILLING AGENCY			MANUFACTURER'S DESIGNATION OF DRILL	
HOLE NO. (As shown on drawing title and file number)			TOTAL NO. OF OVERBURDEN SAMPLES TAKEN	DISTURBED / UNDISTURBED
NAME OF DRILLER			TOTAL NUMBER CORE BOXES	
DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			ELEVATION GROUND WATER	
THICKNESS OF OVERBURDEN			DATE HOLE STARTED	COMPLETED
DEPTH DRILLED INTO ROCK			ELEVATION TOP OF HOLE	
TOTAL DEPTH OF HOLE			TOTAL CORE RECOVERY FOR BORINGS	
			SIGNATURE OF INSPECTOR <i>[Signature]</i>	

ELEVATION a	DEPTH 20.0 b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	CORE OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
705.3		CL	Fill Silty Clay Cont.(Cb)	2x2½	P	HSA at 20.0' sampled to 25.0'
			- U. Soft			
			- M. Plasticity			
			- wet-saturated			
21.0			- Gray w/ occasional ¼" black seam		w.	WL Bo.H Time 21.8 21.8 10:50
22.0			- strong Reaction w/ Acid (Calcareous)		s	22.0 22.0 10:55
			79% clay		H	19.5 19.8 11:03
			20% silt			17.4 19.8 11:50
			1% organics			15.1 19.8 12:45
						14.8 19.8 12:55
23.0			Sharp Alluvium Silty Organic Clay (OL)	D3.0 R2.4 T23.0 SPT 1	SN5 23.0	Rising Water Level
24.0			M. stiff L.to M. plasticity Moist to wet Black Shells & rotten plant matter	0	25.0	- Mix Drilling Fluid 70gal H ₂ O - 30 lbs Bentonine
25.0			82% clay 15% Si.H 3% Organics	2x2½ P		- Set HSA to 24.0'
26.0			Reddish Organic Clay (PT)		SN6 26.9	- Clean Hole to 25.0'
26.9 27.0			- M. stiff - moist - Black & Brown - Plant Matter - shells	U	28.0	
698.4		OL	80% Clay 20% Organics	S H D3.0 R2.5 T28.0 SPT 1	SN7 28.2	
697.1		PT		2	30.0	
695.3				Z		
				B3.0 R1.6 T30.0 SPT 1		- Clean Hole to 30.0'

DRILLING LOG		DIVISION		INSTALLATION		SHEET	
PROJECT		NCO		NCS		OF 16 SHEETS	
LOCATION (Coordinate or Station)				10. SIZE AND TYPE OF BIT			
1. DRILLING AGENCY				11. DAYUM FOR ELEVATION SHOWN (TBM or BM)			
2. HOLE NO. (As shown on drawing title and its number)				12. MANUFACTURER'S DESIGNATION OF DRILL			
3. NAME OF DRILLER				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN			
4. DIRECTION OF HOLE				14. TOTAL NUMBER CORE BOXES			
5. THICKNESS OF OVERBURDEN				15. ELEVATION GROUND WATER			
6. DEPTH DRILLED INTO ROCK				16. DATE HOLE			
7. TOTAL DEPTH OF HOLE				17. ELEVATION TOP OF HOLE			
				18. TOTAL CORE RECOVERY FOR BORING			
				19. SIGNATURE OF INSPECTOR			
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	
695.3	30.0						
		PT	prob organic clay (PT) Cont.	2x2 1/2			
			- soft - M. Stiff	P			
			- Moist	U			
	31.0		- Black to Brown				
			- Shells Plant Matter	S			
			Reacts w/ Acid Strongly				
	32.0		- Some Replacement w/ CaCO ₃ at Depth	H			
			More Replacement the Deeper				
			55% Clay	3.0			
			40% Organics	3.0			
	33.0		5% CaCO ₃	3.0			
			Gradational Change	SPT	SNB		
691.8	33.5		sand like Organic Clay	1	33.0		
			- soft - M. Stiff	1	35.0		
	34.0	OL	- wet - saturated				
			- Black - Brown	2			
			- Peat in seams	3			
	35.0		- sand like CaCO ₃ Replacement product	2x2 1/2			
			- Plant Fibers - Shells				
			50% Clay	P			
			47% sand like stuff				
	36.0		3% Organics	U			
				S			
	37.0			H			
	38.0						
				SPT	2N9		
				1	38.0		
	39.0			0	40.0		
				0			
685.3	40.0						

[illegible]

HILLING LOG		DIVISION		INSTALLATION		Hole No. 92-172M	
PROJECT		NCD		NCS		SHEET 1 OF 2	
LOCATION (Coordinate or Station)		hasla - Stage 3		10. SIZE AND TYPE OF BIT		11. DAY OF ELEVATION SHOWN (TIME & DATE)	
1. DRILLING AGENCY				12. MANUFACTURER'S DESIGNATION OF CORE			
2. HOLE NO. (As shown on drawing title and site number)				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED UNDISTURBED	
3. NAME OF DRILLER				14. TOTAL NUMBER CORE BOXES			
4. DIRECTION OF HOLE				15. ELEVATION GROUND WATER			
<input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				16. DATE HOLE		STARTED COMPLETED	
5. THICKNESS OF OVERBURDEN				17. ELEVATION TOP OF HOLE			
6. DEPTH DRILLED INTO ROCK				18. TOTAL CORE RECOVERY FOR BORING		1	
7. TOTAL DEPTH OF HOLE				19. SIGNATURE OF INSPECTOR			
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SCORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	
675.3	50.0	PT	Clay Organics (PT)	2x2 1/2	P		
	51.0		- M. Stiff		U		
			- Spongy				
			- Moist wet				
			- Black Brown				
			- Wood & plant matter				
	52.0		70% Organics	S		- 2x2 1/2 Blocked By Pine Log	
			30% clay	N			
	53.0		Clay Silt Seam (ML)	3.0			
			- M. Stiff	81.5			
			- Moist - wet	153.0			
			- L. Plasticity	SPT			
			- Gray	3	SNR		
	54.0		85% Silt	4	53.0		
			15% clay	4	54.9		
670.4	54.9	ML	Silty Gravelly Sand (SP-SM)	2.0			
	55.0		- Dense	2.0			
			- Saturated	155.0			
			- Brown	2x2 1/2			
670.0	55.3	SP-SM	50% Sand (M to C)	8			
			40% Gravel (F to C)				
			10% Silt				
	56.0			32		- 2x2 1/2 Blocked Large Gravel	
	57.0						
	58.0			20			
				3.0	SNB		
				11.2	58.0		
	59.0			150.0	60.0		
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			
				40			
				33			
				20			
				3.0			
				11.2			
				150.0			
				SPT			

BELLING LOG		DIVISION	INSTALLATION		Note No.	
PROJECT		NCD	NCS		SHEET 8 OF 10 SHEETS	
LOCATION (Coordinate or Address)						
Hole No. Stage 3						
DRILLING AGENCY			MANUFACTURER'S DESIGNATION OF DRILL			
HOLE NO. (As shown on drawing title and site number)			TOTAL NO. OF OVERBURDEN SAMPLES TAKEN			
NAME OF DRILLER			DISTURBED UNDISTURBED			
DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			TOTAL NUMBER CORE BOXES			
THICKNESS OF OVERBURDEN			ELEVATION GROUND WATER			
DEPTH DRILLED INTO ROCK			DATE HOLE STARTED COMPLETED			
TOTAL DEPTH OF HOLE			ELEVATION TOP OF HOLE			
			TOTAL CORE RECOVERY FOR BORING			
			SIGNATURE OF INSPECTOR			
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
665.3	60.0	SP-7	Silty Gravelly Sand (SP-SM) - M. Dense - Saturated - Brown tan calcareous 80% Sand (M+OC) 40% LS 10% Gravel F 60% silty 10% silt	22 1/2		- 2x2 1/2 Rock Block-J
61.0				49		
62.0				44		
63.0				87		
64.0		SP-SM		D 3.0 R O.O T 63.0		
65.0				SPT 10	SW 14 63.0 65.0	
66.0				12		
67.0				11		
68.0				10		
69.0				R 3.0 R 1.9 T 65.0		- Clean Hole to 65.0' w/R.B
70.0				2x2 1/2		
71.0				30		
72.0				42		
73.0			3' Gradational Silty Sand seam (SP-SM) - Dense - Saturated - Tan Brown - Calcareous 90% Sand (F.to M) 10% silt	50		
74.0				D 3.0 R 1.9 T 65.0		
75.0				SPT 14	SW 15 69.0 70.0	
76.0				20		
77.0				20		
78.0				20		- Clean Hole to 70.0' w/R.B
79.0				20		
80.0				20		
81.0				20		
82.0				20		
83.0				20		
84.0				20		
85.0				20		
86.0				20		
87.0				20		
88.0				20		
89.0				20		
90.0				20		
91.0				20		
92.0				20		
93.0				20		
94.0				20		
95.0				20		
96.0				20		
97.0				20		
98.0				20		
99.0				20		
100.0				20		

Hole No. 92-17221

LOGGING LOG		DIVISION	INSTALLATION	SHEET 8 OF 10 SHEETS
PROJECT		1. ACD	SHU Point District	
LOCATION (Coordinate or Station)		10. SIZE AND TYPE OF BIT		
Chaska - Stage 3		11. DAYTON FOR ELEVATION SHOWN (FEET or METER)		
1. DRILLING AGENCY		12. MANUFACTURER'S DESIGNATION OF DRILL		
4. HOLE NO. (As shown on drawing title and file marked)		13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED UNDISTURBED
5. NAME OF DRILLER		14. TOTAL NUMBER CORE BOXES		
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER		
7. THICKNESS OF OVERBURDEN		16. DATE HOLE STARTED COMPLETED		
8. DEPTH DRILLED INTO ROCK		17. ELEVATION TOP OF HOLE		
9. TOTAL DEPTH OF HOLE		18. TOTAL CORE RECOVERY FOR BORING		
		19. SIGNATURE OF INSPECTOR		

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
655.3	70.0					
655.3		SP-SM	Silty Gravelly Sand (SP-SM)			
			- M. Dense	37		
			- Saturated			
			- Tan Brown			
	71.0		80% Sand <u>at c</u>	27		
			10% Gravel (F)			
			10% S.H			
	72.0			36		
				D 3.0		
				R 2.3		
				T 73.0		
	73.0			SPT	SN16	
				7	73.0	
					75.0	
	74.0			10		
				10		
				12		
				D 2.4		
				R 4.5		
	75.0			2 x 1/2		
				15		
	76.0	SP-SM		26		
	77.0			24		
				D 3.0		
				R 1.6		
	78.0			T 78.0		
				SPT	SN16	
				3	78.0	
				9	80.0	
	79.0			7		
				7		
				D 3.0		
				R 1.3		
				T 78.0		
645.3	80.0					

LOG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT Chaska - Stage 3 HOLE NO. 92-17221

B-62

Hole No. 92-172M

DRILLING LOG		DIVISION		INSTALLATION		
PROJECT		HOLE NO.		SHEET		
Chaska - Stage 3		1085		1085		
LOCATION (Coordinates or Section)		10. SIZE AND TYPE OF BIT		11. DAYTON FOR ELEVATION SHOWN (7500 - 8000)		
1. DRILLER		12. MANUFACTURER'S DESIGNATION OF DRILL		13. DAYTON FOR ELEVATION SHOWN (7500 - 8000)		
2. HOLE NO. (As shown on drawing title)		14. TOTAL NO. OF OVER-DRIVEN SAMPLES TAKEN		15. TOTAL NUMBER CORE BOXES		
3. NAME OF DRILLER		16. DATE HOLE		17. ELEVATION TOP OF HOLE		
4. DIRECTION OF HOLE		18. ELEVATION GROUND WATER		19. TOTAL CORE RECOVERY FOR BORING		
5. THICKNESS OF OVERBURDEN		19. SIGNATURE OF INSPECTOR		20. SIGNATURE OF INSPECTOR		
6. DEPTH DRILLED INTO ROCK		21. SIGNATURE OF INSPECTOR		22. SIGNATURE OF INSPECTOR		
7. TOTAL DEPTH OF HOLE		23. SIGNATURE OF INSPECTOR		24. SIGNATURE OF INSPECTOR		
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
a	b	c	d	e	f	g
			Stoughton Ave.			
			Gravel Road			
			P.P. w/meter			
			Gas Line Substation			
			Base Line			
			1068'			
			N 28° 02'			
			14.0'			
			92-172M			
			*Map Has No Scale			

Hole No. 92-173M

DRILLING LOG		DIVISION NCD	INSTALLATION NCBS	SHEET 1 of 7 SHEETS
1. PROJECT Chaska - Stage 3		10. SIZE AND TYPE OF BIT HSA-2X2 1/2 - SPT-3X RB		
2. LOCATION (Coordinates or Station) See sheet # 7		11. DATUM FOR ELEVATION SHOWN (FIM or MSL) N60D-1989-ADJ		
3. DRILLING AGENCY US-CE-C		12. MANUFACTURER'S DESIGNATION OF DRILL CME-750		
4. HOLE NO. (As shown on drawing title and file number) # 8		13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN 13 - Jar		UNDISTURBED
5. NAME OF DRILLER AL Scipci		14. TOTAL NUMBER CORE BOXES —		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER 715.1'		
7. THICKNESS OF OVERBURDEN 60.0		16. DATE HOLE STARTED 6/6/92 COMPLETED 6/8/92		
8. DEPTH DRILLED INTO ROCK —		17. ELEVATION TOP OF HOLE 727.50		
9. TOTAL DEPTH OF HOLE 60.0		18. TOTAL CORE RECOVERY FOR BORING —		
		19. SIGNATURE OF INSPECTOR [Signature]		

ELEVATION 727.5	DEPTH 0.0	LEGEND c	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY %	BOX OR SAMPLE NO. 1	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
		CL	CL Silty Clay (CL) - V. Soft - L. to M. Plasticity - Calculated to 30' - Gray - R. to H. brown 65.5 30% C.C. 5% organics * Sugar Rec + Process Residue	2X2 1/2		SPT = 140 lbs @ 30" Drop HSA = 4" ID Hollow Stem Auger 4/RB = With 3 1/2" Roller Bit
	10			P		
				U		
	20			S		
				H		- Set HSA To 30'
	30			D 3.0 R 2.2 T 3.0		
				SPT 1		
	40			0		
				1		
	50			0		
				D 2.0 R 2.5 T 3.0		
				2X2 1/2		
	60			P		
				U		- HSA set to 5.0' - sampled to 10.0'
	70			S		WL BtH Time 7.8 7.8 750 Dry 8:00
				H		
	80			D 3.0 R 3.6 T 3.0		
				SPT		
	90			0		- SPT overdrive
				1		
	100			0		
				D 2.0 R 2.5 T 3.0		
				SPT		

Boring Log		INSTALLATION		SHEET		
PROJECT		NO. AND TYPE OF BIT		OF 7 SHEETS		
LOCATION (Geographic or Station)		11. DATUM FOR ELEVATION SHOWN (TBM or BM)				
1. DRILLING METHOD		12. MANUFACTURER'S DESIGNATION OF DRILL				
2. HOLE NO. (As shown on drawing title and this number)		13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED UNDISTURBED		
3. NAME OF DRILLER		14. TOTAL NUMBER CORE BOXES				
4. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER				
5. THICKNESS OF OVERBURDEN		16. DATE HOLE		STARTED COMPLETED		
6. DEPTH DRILLED INTO ROCK		17. ELEVATION TOP OF HOLE				
7. TOTAL DEPTH OF HOLE		18. TOTAL CORE RECOVERY FOR BORING		%		
		19. SIGNATURE OF INSPECTOR				
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
717.5	10.0	CL	Silty Clay (CL) - V. Soft - L. to M. Plastic - Saturated - Gray - Root Layers - 2 in. - Bedrock - 1 in.	22 1/2	P	- HSA set to 10.0' - Sample to 15.0' W. Bot. Time
	11.0				U	14.9 14.9 8:05
	12.0				S	15.7 15.7 8:15
	12.4		W.L.		H	16.2 16.2 8:25
715.1	13.0				D 3.0 A 3.7 T 13.0	
	14.0				SPT	
	15.0				2x2 1/2	
	16.0				P	
	17.0				U	
	18.0				S	
	19.0				11	
	20.0				D 3.0 A 3.2 T 16.0	
	21.0				SPT	
	22.0				O	
	23.0				O	
	24.0				1	
717.6	25.0		see Next Sheet		0	

Hole No. 92-1795M

LOGGING LOG		DIVISION UNR.D		INSTALLATION St. Paul District		SHEET 3 OF 7 SHEETS	
PROJECT Chaska Stage 3				10. SIZE AND TYPE OF BIT			
LOCATION (Coordinate or Station)				11. DAYTIME FOR ELEVATION SHOWN (TBM or BM)			
DRILLING AGENCY				12. MANUFACTURER'S DESIGNATION OF DRILL			
1. HOLE NO. (As shown on drawing title and site number)				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED	
2. NAME OF DRILLER				14. TOTAL NUMBER CORE BOXES		UNDISTURBED	
3. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				15. ELEVATION GROUND WATER		16. DATE HOLE	
7. THICKNESS OF OVERBURDEN				17. ELEVATION TOP OF HOLE		STARTED	
8. DEPTH DRILLED INTO ROCK				18. TOTAL CORE RECOVERY FOR BORING		COMPLETED	
9. TOTAL DEPTH OF HOLE				19. SIGNATURE OF INSPECTOR			

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
707.5	20.0	OL	Paico Topsoil Silty organic clay (OL) - Soft - L. Plasticity - Moist - Black - Plant Matter & Shells 90% clay 15% organics 5% silt	2x2 1/2	SN5 20.0 21.0	
706.5	21.0	OL		U		
	22.0			S		
	23.0		Sand like organic clay (OL) - Soft - L. Plasticity - Spongy - Wet saturated - Black & Brown - Shells & Plant Matter - Strong Rr w/ acid 70% clay	H D 3.0 R 3.0 T 23.0 SPT 1	SN6 22.0 23.0	
	24.0			2		
	25.0		20% Sand (CaCO3) 10% organics Replacement Material	3 D 2.0 T 25.0 2x2 1/2		
	26.0			P		- Clean out to 25.0'
	27.0			U		- HSA set to 25 W.L. 5.0 ft 16.5 28.2 Time 10.00 13.2 27.8 10.08 12.2 27.8 10.32 12.2 27.8 10.47
	28.0			S		Note Bubbling Vigorous
	29.0			H		Gas? Catch some in Bag Flammable Methane
	30.0			D 3.0 R 3.0 T 30.0 SPT 1	SN7 28.0 30.0	Mix Drilling Fluid - 70 gal. H2O - 35 lbs Bentonite
	31.0			0		- Set HSA to 29.0
	32.0			1		- Clean Hole to 30.0' w/ R.B.
697.5	32.0					

LOGGING LOG HEDD		METALLOG St Paul District		SHEET OF 7 SHEETS
Maskastaw Stage 3 LOCATION (Coordinate or Locality)		10. SIZE AND TYPE OF BIT 11. DAYTON PUMP ELEVATION ABOVE (TBM or BBL)		
12. SIGNATURE OF INSPECTOR'S DESIGNATION OF SOILS		13. TOTAL NO. OF OVER- BURDEN SAMPLES TAKEN		
14. NAME OF DRILLER		15. DATE HOLE		16. SIGNATURE OF INSPECTOR
17. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		18. TOTAL NUMBER CORE BOXES		19. ELEVATION GROUND WATER
20. THICKNESS OF OVERBURDEN		21. DATE HOLE		22. SIGNATURE OF INSPECTOR
23. DEPTH DRILLED INTO ROCK		24. TOTAL CORE RECOVERY FOR BORING		25. SIGNATURE OF INSPECTOR
26. TOTAL DEPTH OF HOLE		27. SIGNATURE OF INSPECTOR		28. SIGNATURE OF INSPECTOR

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
697.5	31.0		Sand Like Organic clay (clay) CONT.	28 1/2		
		OL	- U. Soft - soft (springy)	P		
			- L. Plasticity			
			- Saturated			
			- Brown			
			- organic smell	U		
			Roots plant Matter			
			Shells wood	S		
			55% clay	H		
			40% Sand (concretion?) Pie Placemnt	D 3.0 R 1.5 T 33.0		
			5% organics	SPT I		
				I	SNB 33.0 35.0	- Clean Hole to 35.0' w/RB
				I		
				2 D 2.0 R 1.6 T 35.0 27 1/2		
		OL		P		
				U		
				S		
				H		
				D 3.0 R 2.3 T 38.0 SPT		
				I		
				I	SN9 39.0 40.0	- Clean Hole to 40.0' w/RB
				JL		
				2 D 2.0 R 1.6 T 35.0		

Chase - 4/19/68 B-68

Hole No. 92-173M

INSTALLATION: **UCS**

DATE: **9-2-173M**

NO. SIZE AND TYPE OF BIT

DATE FOR ELEVATION SHOWN (TIME OF DRILL)

MANUFACTURER'S DESIGNATION OF DRILL

TOTAL NO. OF OVERBURDEN SAMPLES TAKEN

TOTAL NUMBER CORE BOXES

ELEVATION GROUND WATER

DATE HOLE STARTED COMPLETED

ELEVATION TOP OF HOLE

TOTAL CORE RECOVERY FOR BORING

SIGNATURE OF INSPECTOR

Legend

Classification of Materials (Description)

S CORE RECOVERY

BOX OR SAMPLE NO.

REMARKS
(Drilling time, water loss, depth of weathering, etc., if signified)

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	S CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS
687.5	40.0	OL	Sand like Organic clay (OL)	2 1/2		
			Coat	9		
			Soft			
			- L. Plasticity			
			- Saturated			
			- Brown w/ some Black			
			- Shells Plant Mater			
			- CaCO ₃			
			50% Clay			
			43% Sand (CaCO ₃)			
			7% Organics			
			Silty Clay (CL)			
			- Soft - M St. 58			
			- H. Plasticity			
			- Moist Wet			
			- Gray & Black			
			- Shell Fraggs & plant mater			
			40% Clay			
			7% Silt			
			3% Organics			
			Trace Sand (F)			
			(OL) Same as Above			
			Silty Sandy Gravel (GP-GM)			
			- V. Dense			
			- Saturated			
			- Brown w/ Fe stain			
			10% Gravel (L.S.) Coarse			
			10% Sand (M to C)			
			10% Silt			
			Contact From Blow Count			
			Silty Sand (SP-SM)			
			- M Dense			
			- Saturated			
			- Orange			
			- Fe stain			
			95% Sand F to C			
			5% Silt			
			Trace (F) gravel			

Remarks:

- Clean Hole to 45.0' w/ RB

- 2 1/2 Rock Black

- SPT - Partial Rock Black

- Clean Hole to 50.0' w/ RB

- SPT - Partial Rock Black

- Add 20 lb Bentonite

DIVISION U.C.D.D.		INSTALLATION NES		SHEET OF 7 SHEETS	
PROJECT Aska - Stage 3		10. SIZE AND TYPE OF BIT			
LOCATION (Coordinates or Section)		11. DAYTON FOR ELEVATION KNOWN (FEET or METER)			
DRILLING AGENCY		12. MANUFACTURER'S DESIGNATION OF DRILL			
1. HOLE NO. 74, shown on drawing 740 and 741, opposite		13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED UNDISTURBED	
2. NAME OF DRILLER		14. TOTAL NUMBER CORE BOXES			
3. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER		16. DATE HOLE STARTED COMPLETED	
7. THICKNESS OF OVERBURDEN		17. ELEVATION TOP OF HOLE			
8. DEPTH DRILLED INTO ROCK		18. TOTAL CORE RECOVERY FOR BORING			
9. TOTAL DEPTH OF HOLE		19. SIGNATURE OF INSPECTOR			

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	5 CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
677.5	50.0					
			<u>Silty Sand (SP-SM)</u> Cont.	27 1/2		
			- M. Dense	29		
			- Saturated			
			- Tan Brown			
			- Fe Stain	26		
			95% Sand (M+OC)			
			5% Silt			
			Trace (F, Gravel)	27		
				D3.0 R 2.0 T 53.0 SPT		
				5	SN 12	
			<u>4' Silty Clay Seam (CL)</u>		53.0	
			- Stiff	8	55.0	
			- M. to H. Plasticity			
			- Moist	10		
			- Gray			
			- Laminated	16		
			90% Clay	D3.0 R 1.6 T 55.0 2x2 1/2		
			30% Silt	25		
672.0	55.5					- Clean Hole to 55.0' GYRB
671.6	55.9	CH				- Ruff Drilling
			<u>Sand (SP)</u>			- END of shift -
			- M. Dense	35		6/8/92
			- Saturated			Mix Grout
			- Green tan			35 gal H ₂ O
			96% Sand (M+OC)	50		100 lbs Cement
			4% Silt			35 lbs Bentonite
				D3.0 R 2.2 T 58.0 SPT	SN 13	
				7	59.0	- Tremie Grout
				13	60.0	- Pull Casing
				16		- Top off Hole w/ Grout
				D D3.0 R 1.6 T 60.0		
667.5	62.0					

MR. HERR AND TYPE B BLOOD

11. DAY ON FOR ELEVATION SHOWN (TIN = AREA)

1. MANUFACTURER'S DESIGNATION OF BALL

12. TOTAL NO. OF OVER- BURDEN SAMPLES TAKEN	DISTURBED STUCK	UNDISTURBED STUCK
--	--------------------	----------------------

14. TOTAL NUMBER CORE BOXES _____

12. ELEVATION GROUND WATER

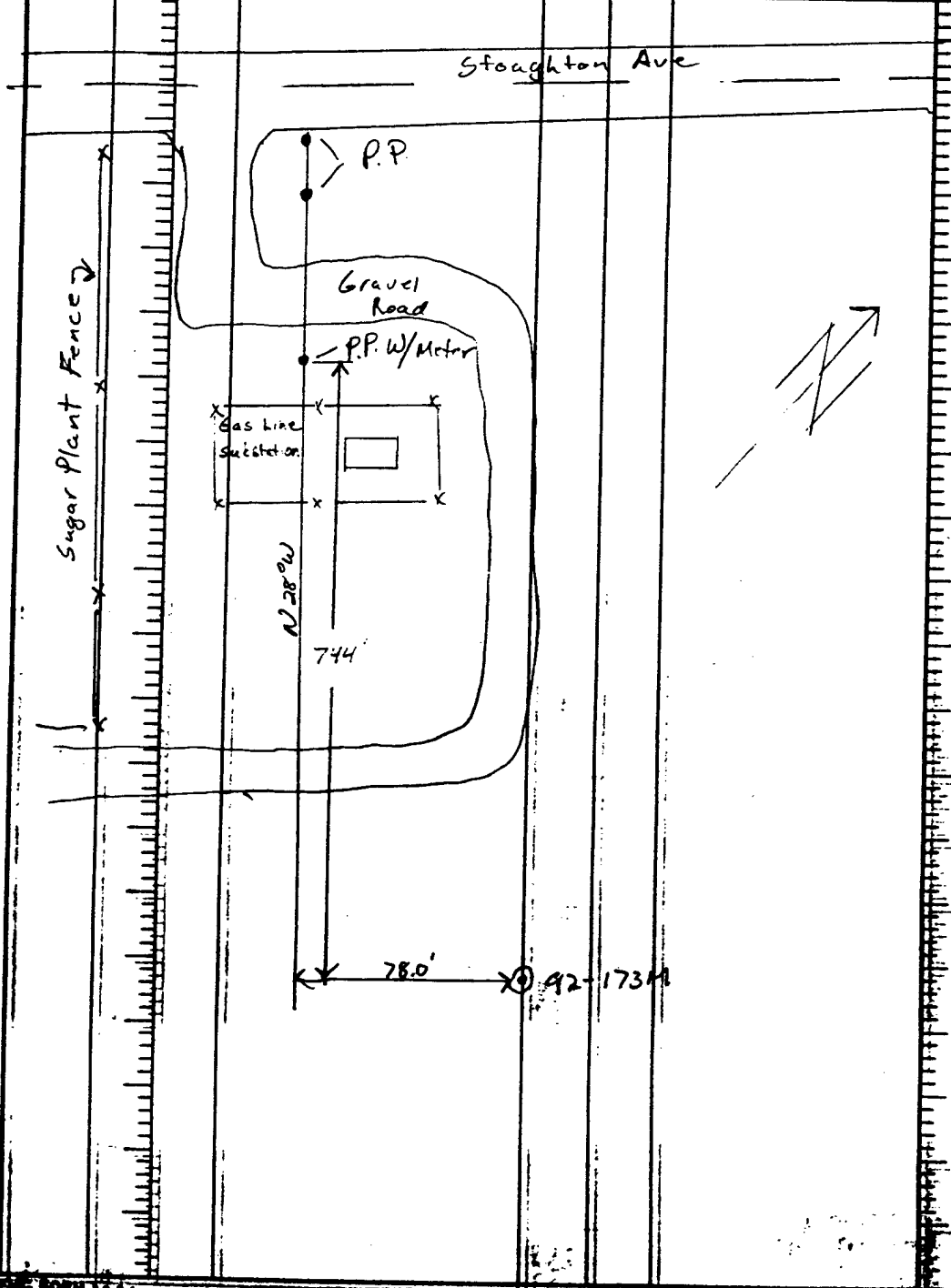
12. DATE HOLD	STARTED	COMPLETED
---------------	---------	-----------

17. ELEVATION TOP OF HOLE

18. TOTAL CORE RECOVERY FOR BORING

19. SIGNATURE OF INSPECTOR _____

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
a	b	c	d	e	f	g



Hole No. 92-174M

DRILLING LOG		DIVISION WLD		INSTALLATION NCS		SHEET 1 of 2	
1. PROJECT Chaske - Stage 3				10. SIZE AND TYPE OF BIT HSA SPT 2 1/2" - 3 1/8" RB			
2. LOCATION (Coordinate or Section) See Sheet # 6				11. DATE FOR ELEVATION SHOWN (Year or Mile) NGVD - 1929 ADJ			
3. DRILLING AGENCY US-CR-C				12. MANUFACTURER'S DESIGNATION OF DRILL CME - 750			
4. HOLE NO. (As shown on drawing title and the number) 10				13. TOTAL NO. OF BURDEN SAMPLES TAKEN 11 = 5AR		14. TOTAL NUMBER CORE BOXES	
5. NAME OF DRILLER AL Seipe				15. ELEVATION GROUND WATER 713.1		16. DATE HOLE STARTED 6/8/92 COMPLETED 6/8/92	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				17. ELEVATION TOP OF HOLE 719.24		18. TOTAL CORE RECOVERY FOR BORING	
7. THICKNESS OF OVERBURDEN 50.0'				19. SIGNATURE OF INSPECTOR K. S. H.		19. SIGNATURE OF INSPECTOR	
8. DEPTH DRILLED INTO ROCK 5							
9. TOTAL DEPTH OF HOLE 50.0'							

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	S CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
719.2	6.8					
			Fill - Clay-silty & rocky (SM)	2 1/2		SPT = 140 lbs @ 30" Drop
	1.0	(SM)	- Loose - M. Driller	P		HSA = 4" ID Halfway
			- M. Driller	U		St - m Anger
			- Brown Black			W/RB = With 3/8" Roller Bit
			- Contains Metal	S		
	2.0		55% Sand (M to C)	H		
			20% silt			
			5% clay			
			5% organics			
	3.0					
				R 3.0		
				R 1.4		
				T 3.0		
				SPT		
				16		
				20		
	4.0			9		SPT Blocked By Concrete
				2		
714.4	4.8		concrete slab 4.8 to 5.0	R 2.0		- Set HSA to 5.0'
	5.0		55'	R 5.0		Large Rocks
				2 1/2		Concrete & Plastic
				86		Trajectory Drilling
713.7	5.5		Clay-silty Sand (SM)			Drill out, Cont
			- Loose			Advance HSA
			- Saturated ~ 6.5			Move 2' (10' HSA)
			- Black	4		- Set HSA to 5.0'
			- Wood			- Set HSA to 8.0'
713.1	6.1	W.L.	60% Sand (F to M to C)			
			30% silt			
			5% clay			
			5% organics	2		- Set HSA to 10.0'
	7.0					- Sample to 10.0'
				R 3.0		WL BOH Time
				R 2.0		9.4 9.9 12.05
				T 8.0		6.1 9.9 1.05
711.2	8.0		Clay-silty, Organics	SPT		
			- U. Cat	0		
			- Spongy			
			- Coarsen	1		
			- Black Brown			
			- Shells Plant Fibers	0		
			60% Organics			
			30% silt			
			10% clay	0		
709.2						

HOLE NO. **100** DIVISION **NCD** INSTALLATION **NCS** HOLE NO. **92-174M**
 LOCATION **6Ka - Stage 3** SIZE AND TYPE OF BIT **NCS** SHEETS **DP-6 SHEETS**
 DATE **10/1/68** DATE FOR ELEVATION ADJUSTMENT **10/1/68**
 DRILLING AGENCY **U.S. ARMY** MANUFACTURER'S DESIGNATION OF DRILL **U.S. ARMY**
 HOLE NO. (As shown on drawing title and file number) **100** TOTAL NO. OF OVERBURDEN SAMPLES TAKEN **1** DISTURBED **1** UNDISTURBED **1**
 NAME OF DRILLER **U.S. ARMY** TOTAL NUMBER CORE BOXES **1** ELEVATION GROUND WATER **1**
 DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED **DES. FROM VERT.** DATE HOLE **10/1/68** STARTED **10/1/68** COMPLETED **10/1/68**
 THICKNESS OF OVERBURDEN **1** ELEVATION TOP OF HOLE **1**
 DEPTH DRILLED INTO ROCK **1** TOTAL CORE RECOVERY FOR BORING **1**
 TOTAL DEPTH OF HOLE **1** SIGNATURE OF INSPECTOR **1**

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	S CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
709.2	10.0	F	Silty Clay organic - V. Soft - Spongy - Saturated - Black Brown - Roots of plant material 20% Fine sand 35% Clay 15% Silt	2x2 1/2	1	
	11.0			P		
	12.0			U		
	13.0			U		
	14.0			U		
705.1	14.1	ML	Sandy Clay Silt (ML) - V. Soft to Soft - L. Plasticity - Wet Saturated - Gray Black 10% Clay 15% F. Sand 5% Plant Material	D 3.0 R 1.6 T 13.0 SPT	2	Set HSA to 14.0 Mix Drilling Fluid 70 gal H ₂ O 35 lbs Bentonite
704.4	14.8			2	14.1	
	15.0	SP	3/4" to 1" Gravel at contact Sand (SP) - Loose - Saturated - Tan Brown 96% (F to G) Sand 4% Silt Trace F. Gravel	D 2.0 R 1.9 T 15.0 2x2 1/2	3	Clean Hole to 15.0' W/RB
	16.0			P		
	17.0			U		
	18.0			S		
	19.0			4		
	20.0			5		
	21.0			6		
	22.0			7		
	23.0			8		
	24.0			9		
	25.0			10		
	26.0			11		
	27.0			12		
	28.0			13		
	29.0			14		
	30.0			15		
	31.0			16		
	32.0			17		
	33.0			18		
	34.0			19		
	35.0			20		
	36.0			21		
	37.0			22		
	38.0			23		
	39.0			24		
	40.0			25		
	41.0			26		
	42.0			27		
	43.0			28		
	44.0			29		
	45.0			30		
	46.0			31		
	47.0			32		
	48.0			33		
	49.0			34		
	50.0			35		
	51.0			36		
	52.0			37		
	53.0			38		
	54.0			39		
	55.0			40		
	56.0			41		
	57.0			42		
	58.0			43		
	59.0			44		
	60.0			45		
	61.0			46		
	62.0			47		
	63.0			48		
	64.0			49		
	65.0			50		
	66.0			51		
	67.0			52		
	68.0			53		
	69.0			54		
	70.0			55		
	71.0			56		
	72.0					

LOG		DIVISION		INSTALLATION		Hole No.	
NCD		NCD		NCD		92-174M	
Hole No. 74a - Stage 3				10. SIZE AND TYPE OF BIT			
11. DAYON FOR ELEVATION BROWN (92M - 100M)				12. MANUFACTURER'S DESIGNATION OF SKILL			
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN				DISTURBED		UNDISTURBED	
14. TOTAL NUMBER CORE BOXES				15. ELEVATION GROUND WATER			
16. DATE HOLE				STARTED		COMPLETED	
17. ELEVATION TOP OF HOLE				18. TOTAL CORE RECOVERY FOR BORING			
19. SIGNATURE OF INSPECTOR				20. SIGNATURE OF INSPECTOR			
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	S CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	
649.2	20.0		Sand	2x2 1/2			
		SP	- Loose - N-Dense	P			
			- Saturated				
			- Tan Brown				
21.0			96% Sand (F. to C)	4			
			4% silt				
			Trace F. Gravel				
22.0			* Sands Irregular	5			
			F. & Coarse Sands	H			
			~ 5' to 1' in				
			Thickness				
23.0				D 3.0			
				R 1.9			
				T 23.0			
				SPT			
				1			
24.0				4			
					SN6		
					23.0		
					25.0		
				3			
25.0				5			
				D 2.0			
				R 1.9			
				T 25.0			
				2x2 1/2			
				10			
26.0		SP					
				16			
27.0				22			
				D 3.0			
				R 1.9			
				T 28.0			
				SPT			
				2			
29.0				7			
				8			
					SN7		
					26.0		
					30.0		
649.2	30.0						

- Clean Hole to 25.0' W/RB

- Clean Hole to 30.0' W/RB

FORM 12-36
MAR 74

PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT
Chacka - Stage 3
B-74

Hole No.
92-174M

INSTALLATION: NCS
10. SIZE AND TYPE OF BIT: NCS
11. DATE FOR ELEVATION BROWN (T.M. - 2000)
12. MANUFACTURER'S DESIGNATION OF BELL
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE STARTED COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING
19. SIGNATURE OF INSPECTOR

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
689.2	38.0					
		SP	Sand (SP) - M. Dense - Saturated - Tan Brown 96% Sand 4% Silt Trace F. Gravel * Gravel Zone 33.0' to 35.0' 10% Gravel F	2x2 1/2		
	31.0			18		
				24		
	32.0			24		
				D 3.0 R 2.6 T 33.0	SN 8	
	33.0			SPT 2	33.0 35.5	
	34.0			4		
				6		
	35.0			10 D 2.0 R 1.5 T 35.0 2x2 1/2		- Clean Hole to 35.0' w/ RB
	36.0			10		
				21		
	37.0			32		
				D 3.0 R 1.5 T 38.0	SN 9	
	38.0			SPT 4	38.0 40.6	
				7		
	39.0			11		- Clean Hole to 40.0' w/ RB
				13 D 2.0 R 1.5 T 40.0		

Main No. 92-1394

DURD

K-20 Stages

Hole No. 74 shown on drawing title and log.

NAME OF DRILLER

DIRECTION OF HOLE
☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.

THICKNESS OF OVERBURDEN

DEPTH DRILLED INTO ROCK

TOTAL DEPTH OF HOLE

DATE HOLE STARTED COMPLETED

ELEVATION TOP OF HOLE

TOTAL CORE RECOVERY FOR BORING

SIGNATURE OF INSPECTOR

ELEVATION 679.2	DEPTH 40.0	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
			Sand (SP)	2x2 1/2		
			- M. Dense	11		
			- Saturated			
			- Tan Brown			
			% Sand (F to C)	18		
			% Silt			
			Trace F. Gravel			
	410			18		
	420			D3.0		
				R 2.1		
	430			T 53.0		
				SPT		
				5		
	440		1/4" Seam	7		
675.2		SP	Fe Stain under Clay	9		
	450			14		
				D 2.0		
				R 1.8		
				T 45.0		
				2x2 1/2		
				22		
	460			45		
				57		
	470			D3.0		
				R 2.3		
	480			T 48.0		
				SPT		
				7		
	490			15		
				12		
669.2	500		END of Boring	15		
				D 2.0		
				R 2.0		
				T 48.0		

SNID
45.0
45.0

SNID
45.0
45.0

- Clean Hole to
45.0' w/RB

- Mix Drilling
Fluid

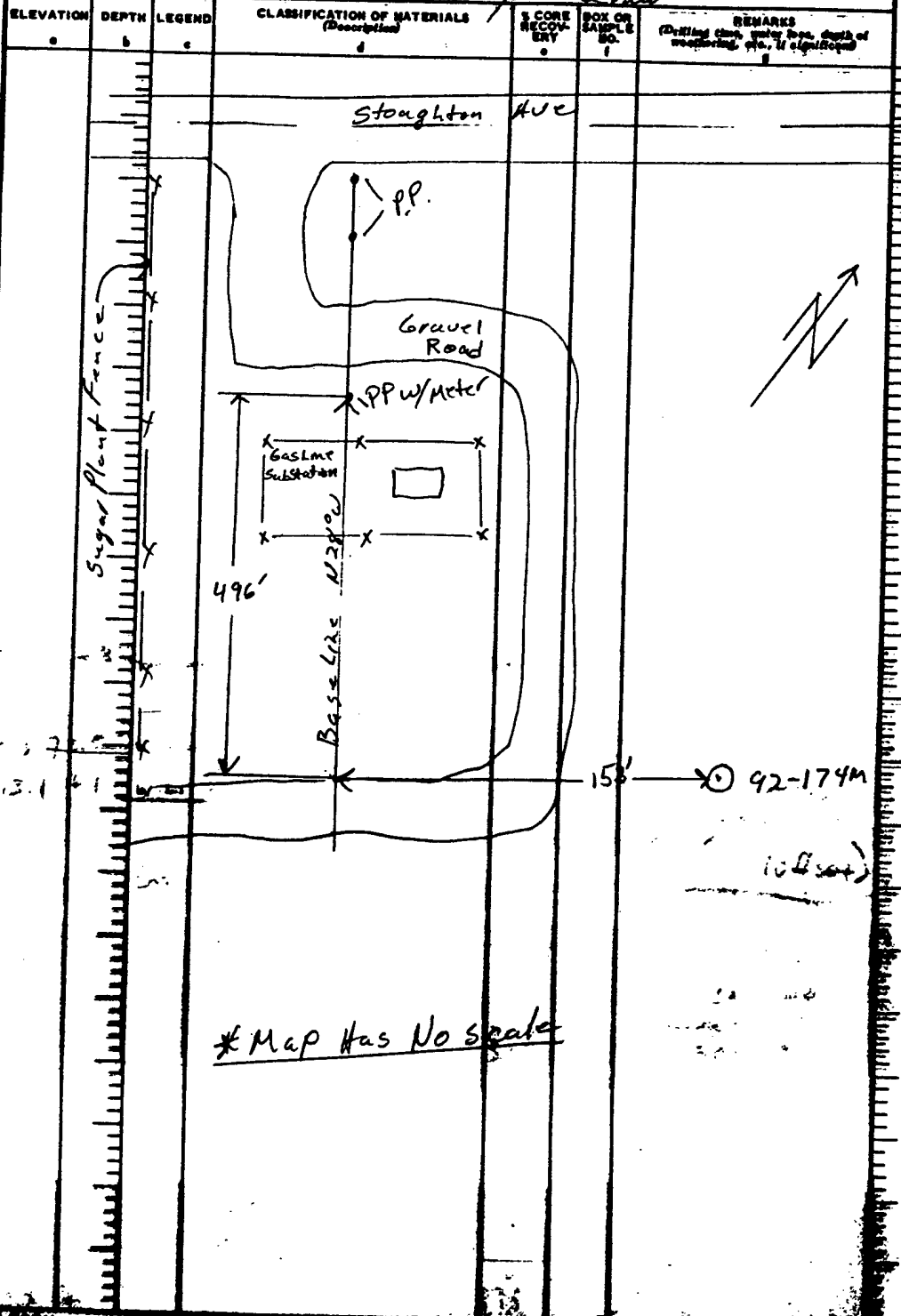
- 35 gal slurry
100 lbs cement

- Tremie grout

- Pull casing

- Add Grout to Hole
To Surface

LOG		District	
Stoughton - Stage 3		Stoughton District	
HOLE NO. (As shown on preceding map)		DATE AND TIME OF DAY	
NAME OF DRILLER		DAY OF YEAR FOR ELEVATION MEASUREMENT	
DIRECTION OF HOLE		ELEVATION OF SURFACE OF GROUND	
THICKNESS OF OVERBURDEN		ELEVATION OF SURFACE OF GROUND	
DEPTH DRILLED INTO ROCK		ELEVATION OF SURFACE OF GROUND	
TOTAL DEPTH OF HOLE		ELEVATION OF SURFACE OF GROUND	
ELEVATION TOP OF HOLE		ELEVATION OF SURFACE OF GROUND	
TOTAL CORE RECOVERY FOR BORING		ELEVATION OF SURFACE OF GROUND	
SIGNATURE OF INSPECTOR		ELEVATION OF SURFACE OF GROUND	



LOG OF BORING



PROJECT: 74-139 SOIL BORINGS Effluent Polishing Plant Chaska Treatment Plant Chaska, MN	BORING: ST-1 LOCATION: 2' East, 1' North of Stairsteps (NE corner)
DATE: 4-22-74	
SCALE: 1"=4'	

Elev.	Depth	Description of Materials	BPF	WL	Tests or Notes
712.4	0				Page 1 of 2
		Fill, Samples ranged from plastic, Sandy Loam to Sandy Clay Loam, with a trace of Gravel, with traces of organic material and fibers, dark brown and dark gray, moist to wet (medium to rather stiff)			Surface elevation referenced to floor slab of structure, elevation = 715.4
			10		M.C. = 12.3%
			8		M.C. = 12.0%
			<input checked="" type="checkbox"/>		T.W. #1
			10		M.C. = 16.0%
			35		*Sampler encountered piece of coarse gravel M.C. = 14.0%
699.4	13	Organic Sandy Loam, with vegetation, glass, tins, branches, and fibers, black, very wet (soft topsoil and debris)	6		M.C. = 13.9%
697.4	15		<input checked="" type="checkbox"/>		T.W. #2
		Slightly organic Silty Clay Loam to Silty Clay, with some layers of slightly organic Clay, with a trace of roots and fibers, very dark gray to black, wet (medium to rather soft alluvium)	4		
			<input checked="" type="checkbox"/>		T.W. #3
			6		M.C. = 51.6 L.L. = 53 O.C. = 8.9 P.L. = 24
			6		M.C. = 50.1% O.C. = 9.3%
			<input checked="" type="checkbox"/>		T.W. #4
			5		M.C. = 78.9 L.L. = 107 O.C. = 13.6 P.L. = 45
682.4	30		21/6		M.C. = 65.8% O.C. = 11.2%
		continued on next page			

(See Report and Standard Plates for evaluation and descriptive terminology.)

B-78

LOG OF BORING



PROJECT: 74-139 SOIL BORINGS
Effluent Polishing Plant
Chaska Treatment Plant
Chaska, MN

BORING: ST-1 (continued)
LOCATION:

DATE: 4-22-74

SCALE: 1"=4'

Elev.	Depth	Description of Materials	BPF	WL	Tests or Notes
682.4	30	(continued from previous page)			
		Fine Sand to Fine Loamy Sand, gray, dark gray and light brown, waterbearing (medium dense to dense)			
			33		
672.4	40			72	
		Water level down 12.5' with 40' of hollow-stem auger in ground. Water level down 11' immediately after withdrawal of auger. Water level down 10.9' 1 day after completion of boring.			

Page 2 of 2

(See Report and Standard Plates for evaluation and descriptive terminology.)

B-79

LOG OF BORING

DMU
ENGINEERING TESTING

PROJECT: 74-139A Foundation Investigation
Proposed Plant Expansion
Chaska Wastewater Treatment
Plant

BORING: ST-2

LOCATION:

See Attached Sketch.

DATE: 1/13/78

SCALE: 1"=4'

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Tests or Notes
712.9	0					Sheet 1 of 2
708.9	4	SM	SILTY SAND, dark brown to black, moist. (Fill)			Bench Mark = Top of slab, existing Control Building. Elevation = 712.5.
706.9	6	SP	SAND, fine to medium-grained, with a trace of SILT, light brown, moist, loose. (Fill)	7		
		SM	SILTY SAND, fine to medium-grained, with a trace of organic, with a trace of brocks, gray, moist, loose to very loose. (Fill)	7		
701.9	11			4		
699.9	13	CL	SILTY CLAY, with a trace of organic, with a trace of wood, gray, moist, rather soft. (Fill)	4		
		MH	CLAYEY SILT, with a trace of organics, dark gray, moist, loose. (Fine Alluvium)	5		MC = 63.7% DD = 57.6 pcf MC = 88.4% MC = 36.1% DD = 34.2 pcf Qu = 1500 psf LL = 68% PL = 26% OC = 4.7%
696.9	16					
		CH	SILTY CLAY, with a trace of SAND, with a trace of fibers, with a trace of organics, dark gray to black, moist, rather soft. (Fine Alluvium)	TW		
688.9	24			4		
		SC	CLAYEY SAND, with a trace of fibers, dark gray, wet, very loose (Coarse Alluvium)	4		
686.9	26					
		SP	SAND, fine to medium-grained, brown, waterbearing, medium dense. (Coarse Alluvium)			
682.9	30					
				12		
			(continued on Sheet 2)			

(See Report and Standard Plates for evaluation and descriptive terminology.)

B-80

LOG OF BORING

BRAUN
ENGINEERING TESTING

PROJECT: 74-139A Foundation Investigation
Proposed Plant Expansion
Chaska Wastewater Treatment
Plant

BORING: ST-2 (continued)

LOCATION:

DATE: 1/13/78

SCALE: 1"=4'

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Tests or Notes
682.9	30					Sheet 2 of 2
680.9	32	SP	SAND, fine to medium-grained, brown, waterbearing, medium dense. (Coarse Alluvium)			
		SP	SAND, fine to medium-grained, with a trace of fine to medium Gravel, brown, waterbearing, medium dense to dense. (Coarse Alluvium)	23		
672.4	40.5			30		
			Water level down 25' with 40' of hollow-stem auger in ground. Water level down 23' immediately after withdrawal of auger. Boring immediately backfilled.			

(See Report and Standard Plates for evaluation and descriptive terminology.)

B-81

LOG OF BORING

DMU
ENGINEERING TESTING

PROJECT: 85-082 FOUNDATION INVESTIGATION Chaska Wastewater Treatment Plant Chaska, MN					BORING: ST-6	
					LOCATION: Headworks Building See Attached Sketch.	
					DATE: 3/22/85	SCALE: 1"=4'
Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
715.7	0					Page 1 of 2
713.7	2	SM	FILL: SILTY SAND, fine to medium-grained, dark brown, very moist.			Surface elevation of borings were referred to the floor slab of the Control Building. An elevation of 712.5 was indicated for the floor elevation.
711.7	4	SC	FILL: CLAYEY SAND, fine to medium-grained, dark brown.	28		
		SM	FILL: SILTY SAND, fine-grained, dark brown, moist.	12		
708.7	7					
		SM	FILL: SILTY SAND, fine-grained, with glass and wood and other debris, brown, moist.	7		
				5		
703.7	12					
		SM & SC	FILL: SILTY SAND and CLAYEY SAND, fine-grained, with glass and wood debris, black, wet.	4		
698.7	17			11		
		CH	SILTY CLAY, non to slightly organic, with a trace of roots and shells at 20 feet, gray to black, wet, rather soft to medium (Fine Alluvium)	5		
						MC = 35% LL = 48% PL = 21% PI = 27%
						TW#3
						Approximate grade of Headworks Building.
						LL=140% PL=57% PI=83% MC=91%
686.7	29					
685.7	30	SP	SAND, fine to medium-grained,*	7		*brown, waterbearing, loose. (Coarse Alluvium)

(continued on page 2)

B-82

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING

BRUIII
ENGINEERING TESTING

PROJECT: 85-082 FOUNDATION INVESTIGATION
Chaska Wastewater
Treatment Plant
Chaska, MN

BORING: ST-6 (continued)

LOCATION:

Headworks Building
See Attached Sketch

DATE: 3/22/85

SCALE: 1"=4'

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
685.7	30	SP	SAND, fine to medium-grained, brown, waterbearing, loose. (Coarse Alluvium)			Page 2 of 2
680.2	35.5		Water level down 29' with 35' of hollow-stem auger in the ground. Water level down 11' immediately after withdrawal of auger. Water level down 11' when rechecked 1/2 hour later.	8		

(See Report and Standard Plates for evaluation and descriptive terminology.)

B-83

LOG OF BORING

ENGINEERING TESTING

PROJECT: 85-082 FOUNDATION INVESTIGATION
Chaska Wastewater
Treatment Plant
Chaska, MN

BORING: ST-8

LOCATION:

CL2 Contact Tank
See Attached Sketch.

DATE: 3/22/85

SCALE: 1"=4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
713.7	0					Page 1 of 2
711.7	2	SM	FILL: SILTY SAND, fine-grained, black.			
709.7	4	SM	FILL: SILTY SAND, fine to medium-grained, dark brown, moist.	18		
		SM-SC & SM	FILL: SILTY CLAYEY SAND and SILTY SAND, fine to medium-grained, with some wood, dark brown to brown.	53		
704.7	9			25		
701.7	12	SP-SM	FILL: SLIGHTLY SILTY SAND. with some CLAYEY SAND, fine to medium-grained, brown, moist to wet.	34		
699.7	14	CL	FILL: SILTY CLAY, with wood and a trace of PEAT, black, wet.			
		CL	SILTY CLAY and a layer of SILTY SAND, fine-grained, gray, wet. (Probable Fill)	10		
694.7	19					Approximate grade of Contact Tank.
		CH	SILTY CLAY, non to slightly organic, dark gray with layers of black, wet, medium to rather soft. (Fine Alluvium)	6		
				4		MC=44Z LL=83Z PL=34Z PI=49Z
686.7	27					
683.7	30	SM/SP-SM	SILTY SAND TO SLIGHTLY SILTY SAND, fine to medium-grained, gray, waterbearing, medium dense. (Coarse Alluvium)	14		
			(continued on Page 2)			B-84

LOG OF BORING

ENGINEERING TESTING

PROJECT: 85-082 FOUNDATION INVESTIGATION
Chaska Wastewater
Treatment Plant
Chaska, MN

BORING: ST-8 (continued)

LOCATION:
CL2 Contact Tank
See Attached Sketch

DATE: 3/22/85

SCALE: 1"=4'

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
683.7	30					Page 2 of 2
678.2	35.5	SM/ SP-SM	SILTY SAND to SLIGHTLY SILTY SAND, fine to medium-grained, gray, waterbearing, medium dense. (Coarse Alluvium)		12	
			Water level down 31' with 35' of hollow-stem auger in ground. Water level not encountered to cave-in depth of 11' immediately after withdrawal of auger. Water level down 10½' 5 hours later.			

B-85

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING



PROJECT: 85-082A FOUNDATION INVESTIGATION
Proposed Chaska Treatment Plant
Expansion
Chaska, MN

BORING: ST-10
LOCATION: Proposed Headworks
Building-
See location sketch.

DATE: 9/18/85 **SCALE:** 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
715.4	0	SM	FILL: SILTY SAND, fine to medium grained, with roots, wood, glass, cobbles, and boulders, dark brown, moist.			Sheet 1 of 2
697.4	18					
		CL-ML	SILTY CLAY, with a trace of roots, grayish black, wet, rather soft, (Fine Alluvium)	5		
690.9	24.5					TW #1 MC=29% Organic Content = 7.6%
		CH	FAT CLAY, dark gray to black, wet, rather stiff. (Fine Alluvium)	9		
686.4	29					MC=59% TW #2 LL=106% QU=1134 FL=38% psi PI=68
685.4	30	SP	SAND, fine to medium-grained, with some POORLY GRADED GRAVEL, gray, moist.	10		*waterbearing, loose to medium dense. (Coarse Alluvium)
			(Continued on Sheet 2)			B-86

LOG OF BORING



PROJECT: 85-082A FOUNDATION INVESTIGATION
 Proposed Chaska Treatment Plant
 Expansion
 Chaska, MN

BORING: ST-10 (Continued)

LOCATION:

DATE:

SCALE:

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
685.4	30	SP	SAND, fine to medium-grained, with some POORLY GRADED GRAVEL, gray, waterbearing, loose to medium dense. (Coarse Alluvium)			Sheet 2 of 2
				14		
674.9	40.5			10		
			END OF BORING. Water level down 25' with 40' of hollow-stem auger in the ground. Water level down 16' immediately after withdrawal of auger. Water level down 12' 3 hours after completion of boring. Water level down 11' 1 day after completion of boring. Water level down 11' 2 days after completion of boring. Boring then backfilled.			

(See Report and Standard Plates for evaluation and descriptive terminology.)

B-87

LOG OF BORING



PROJECT: 85-082A FOUNDATION INVESTIGATION
Proposed Chaska Treatment Plant
Expansion
Chaska, MN

BORING: ST-11
LOCATION: 52' South of Proposed
Screw Pump-
See location sketch.

DATE: 9/19-20/85 SCALE: 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
725.9	0					Sheet 1 of 3
		SM	FILL: SILTY SAND, fine-grained, with some POORLY GRADED GRAVEL, with a trace of wood, brown and gray, moist, medium dense.			
				18		
				11		
711.9	14					
		SM	FILL: SILTY SAND, fine to coarse grained, with a trace of roots, gray, moist, medium dense.	18		
			layer of wood at 18'. Cobbles and Boulders at 19'.			
706.9	19					
		MH	FILL: ELASTIC SILT, with a trace of roots and fibers, some cinders brown to gray, moist to wet, rather soft.	5		
703.9	22					
		SP	SAND, fine to medium-grained, light brown, moist, medium dense. (Coarse Alluvium)			
				13		
698.9	27					
		MH	ELASTIC SILT, with lenses of SANDY SILT, gray, wet to waterbearing, medium.			
695.9	30		(Fine Alluvium)	7		

(Continued on Sheet 2)

B-88

LOG OF BORING

BRAUN
ENGINEERING TESTING

PROJECT: 85-082A FOUNDATION INVESTIGATION
Proposed Chaska Treatment Plant
Expansion
Chaska, MN

BORING: ST-II (Continued)

LOCATION:

DATE:

SCALE:

(See Report and Standard Plates for evaluation and descriptive terminology.)

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
695.9	30					Sheet 2 of 3
691.9	34	MH	ELASTIC SILT, with lenses of SANDY SILT, gray, wet to waterbearing, medium. (Fine Alluvium)			
686.9	39	CL-ML	SILTY CLAY, with decayed reeds, dark gray, wet to waterbearing, rather soft. (Fine Alluvium)	5		
682.9	43	CH	FAT CLAY, with some fibers, dark gray, wet to waterbearing, medium. (Fine Alluvium)	8		
679.9	46	SM	SILTY SAND, fine-grained, with a trace of POORLY GRADED GRAVEL and cobbles, gray, waterbearing, loose. (Coarse Alluvium)	9		
		SP	SAND, fine to medium-grained, with a trace of POORLY GRADED GRAVEL, brown to gray, waterbearing, medium dense. (Coarse Alluvium)	12		
				18		
666.9	59					
665.9	60	SP	SAND, fine to coarse-grained, with a trace of POORLY GRADED *	28		
			(Continued on Sheet 3)			

*GRAVEL, light brown, waterbearing, medium dense.
(Coarse Alluvium)

B-89

LOG OF BORING



PROJECT: 85-082A FOUNDATION INVESTIGATION
Proposed Chaska Treatment Plant
Expansion
Chaska, MN

BORING: ST-II (Continued)

LOCATION:

DATE:

SCALE:

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
665.9	60					Sheet 3 of 3
		SP	SAND, fine to coarse-grained, with a trace of POORLY GRADED GRAVEL, light brown, waterbearing medium dense. (Coarse Alluvium)			
659.9	66			24		
			END OF BORING. Water level down 31' with 35' of hollow-stem auger in the ground. Water level down 8' with 65' of hollow-stem auger in the ground. Water level down 22' immediately after withdrawal of auger. Water level down 25' 1 hour after completion of boring. Boring then backfilled. Jetting water used to clear the auger below the 49' depth.			

B-90

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF TEST BORING

JOB NO 4220 89-1312 VERTICAL SCALE 1" = 4' BORING NO 12
 PROJECT CARVER COUNTY GOVERNMENT CENTER - CHASKA, MINNESOTA

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS			
					NO	TYPE	W	D	LL PL	expl.
	<u>SURFACE ELEVATION 723.7'</u>									
	FILL, MIXTURE OF SILTY SAND AND SAND, some clayey sand and lean clay, a little gravel, some concrete, brick, wood, metal and glass, a few cobbles, black, dark brown, brown and grayish brown, a little water in fill at about 24½'	FILL			1	HSA				
			13		2	SB				
			19		3	SB				
			9		4	SB				
			21		5	SB				60%
			39		6	SB				
			17		7	SB				50%
			14		8	SB				
			4		9	SB				
24½	FAT CLAY, black, rather stiff (CH)	FINE ALLUVIUM	10		10	SB				
26	End of Boring									
	NOTE: Boring backfilled with grout from depth of 5' to surface									

WATER LEVEL MEASUREMENTS

START 6-9-89 COMPLETE 6-9-89

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
6-9	12:00	26'	24½'	26'	no	24½'
6-9	12:10	26'	None	19½'	no	None
					no	
					no	

METHOD 3½" HSA 0-24½' @ 12:00

CREW CHIEF M. Crotty

B-91

LOG OF TEST BORING

JOB NO. 4220 89-1312 VERTICAL SCALE 1" = 4' BORING NO. 13
PROJECT CARVER COUNTY GOVERNMENT CENTER - CHASKA, MINNESOTA

DEPTH IN FEET	DESCRIPTION OF MATERIAL SURFACE ELEVATION 722.4'	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS			
					NO	TYPE	W	D	LL PL	EXP.
	FILL, MIXTURE OF SILTY SAND, CLAYEY SAND AND SAND W/A LITTLE GRAVEL, some concrete, metal, brick, glass and wood, a little lean clay, dark brown and grayish brown, water in fill below about 21'	FILL			1	HSA				
			18	2	SB					
			5	3	SB					
			4	4	SB					
			12	5	SB				10%	
			3	6	SB					
			9	7	SB				50%	
			7	8	SB					
			5	9	SB					
				10	SB					
23	LEAN CLAY, gray, medium (CL)	FINE ALLUVIUM	6		11	SB				
24	FAT CLAY, black, medium (CH)									
26	End of Boring		6		12	SB				
NOTE: Boring backfilled with grout from depth of 5' to surface										

WATER LEVEL MEASUREMENTS							START <u>6-8-89</u> COMPLETE <u>6-8-89</u>
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL	METHOD <u>3 1/2" HSA 0-24 1/2'</u> @ <u>1:50</u>
6-8	1:20	21 1/2'	19 1/2'	21 1/2'	to	21'	
6-8	1:50	26'	24 1/2'	26'	to	21 1/2'	
6-8	2:00	26'	None	19'	to	None	
					to		

CREW CHIEF M. Crotty B-92

LOG OF TEST BORING

JOB NO 4220 89-1312 VERTICAL SCALE 1" = 4' BORING NO 15
 PROJECT CARVER COUNTY GOVERNMENT CENTER - CHASKA, MINNESOTA

DEPTH IN FEET	DESCRIPTION OF MATERIAL SURFACE ELEVATION <u>720.7'</u>	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS			
					NO	TYPE	W	D	LL PL	
	FILL, MIXTURE OF SILTY SAND, CLAYEY SAND AND SAND W/A LITTLE GRAVEL, a little brick and metal, dark brown, brown and black	FILL			1	HSA				
			13		2	SB				
			2		3	SB				
			3		4	SB				
9	SILTY SAND, fine grained, black, moist, loose (may be fill) (SM)	TOPSOIL OR FILL	5		5	SB				0%
12	SILTY SAND, fine grained, dark brown, moist, loose (may be fill) (SM)	COARSE ALLUVIUM*	6		6	SB				
13	CLAYEY SAND, brown, medium (SC)	MIXED ALLUVIUM			7	SB	19			
14½	SAND, a few cobbles, fine grained, light brown, moist to 22½' then waterbearing, medium dense to dense (SP)	COARSE ALLUVIUM	12		8	SB				0%
			26		9	SB				
			20		10	SB				
26	End of Boring	*OR FILL								

WATER LEVEL MEASUREMENTS

START 6-8-89 COMPLETE 6-8-89

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL	METHOD	TIME
6-8	3:15	26'	24½'	25'	to	22½'	3½" HSA 0-24½'	@ 3:15
6-8	3:25	26'	None	17'	to	None		
					to			
					to			
CREW CHIEF <u>M. Crotty</u>							<u>B-93</u>	

LOG OF TEST BORING

JOB NO 4220 89-1312 VERTICAL SCALE 1" = 4' BORING NO 17
 PROJECT CARVER COUNTY GOVERNMENT CENTER - CHASKA, MINNESOTA

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS			
					NO	TYPE	W	D	LL PL	expt.
	SURFACE ELEVATION <u>722.0'</u>									
	FILL, MIXTURE OF SILTY SAND AND SAND W/A LITTLE GRAVEL, a little brick and metal, brown and black	FILL			1	HSA				
			27		2	SB				
9	FILL, MIXTURE OF SILTY SAND, BRICK, WOOD AND CINDERS, dark grayish brown		7		3	SB				
			6		4	SB				5%
18½	CLAYEY SAND, dark brown to brown, soft (SC)	MIXED ALLUVIUM	4		5	SB				
22	SAND W/A LITTLE GRAVEL, a few cobbles, fine to medium grained, light brown, moist to 23½' then waterbearing, medium dense (SP)	COARSE ALLUVIUM	11		6	SB				
	NOTE: Boring backfilled with grout from depth of 5' to surface		12		7	SB				
31	End of Boring									

WATER LEVEL MEASUREMENTS

START 6-12-89 COMPLETE 6-12-89

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL	METHOD	TIME
6-12	12:15	26'	24½'	25'	10	23½'	3½" HSA 0-29½'	@ 12:35
6-12	12:35	31'	29½'	29½'	10	24'		
6-12	12:45	31'	None	19'	10	None		
					10			

CREW CHIEF

M. Crotty

B-94

LOG OF TEST BORING

JOB NO 4220 89-1312 VERTICAL SCALE 1" = 4' BORING NO 27
 PROJECT CARVER COUNTY GOVERNMENT CENTER - CHASKA, MINNESOTA

DEPTH IN FEET	DESCRIPTION OF MATERIAL SURFACE ELEVATION <u>720.7'</u>	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS			
					NO	TYPE	W	D	LL PL	expl.
	FILL, MIXTURE OF CLAYEY SAND AND SILTY SAND, some brick and gravel, a little metal and wood, black, dark brown, grayish brown and brown (See Note)	FILL			1	HSA				
			15		2	SB				
			9		3	SB				
			10		4	SB				
			10		5	SB				
			6		6	SB				0%
			9		7	SB				
			13		8	SB				
21			10		9	SB				
	End of Boring									
	NOTE: Encountered sanitary sewer line at depth of 19'. Left hollow stem auger in borehole upon request of City of Chaska Sewer Department. They removed in excavating for the repair of the sewer line.									

WATER LEVEL MEASUREMENTS

START 6-8-89 COMPLETE 6-9-89

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL	METHOD	TIME
6-9	9:30	21'	19½'		10	NMR	3½" HSA 0-19½'	9:30
					10			
					10			
					10			
CREW CHIEF							M. Crotty	B-95

LOG OF TEST BORING

JOB NO 4220 89-1312 VERTICAL SCALE 1" = 4' BORING NO 30
 PROJECT CARVER COUNTY GOVERNMENT CENTER - CHASKA, MINNESOTA

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS			
					NO	TYPE	W	D	LL PL	Qu
	<div> <div> <div></div> <div>SURFACE ELEVATION <u>725.8'</u></div> </div> </div>									
	FILL, MIXTURE OF SILT AND SILTY SAND W/A LITTLE GRAVEL, dark brown, brown and black	FILL			1	HSA				
			21		2	SB				
7	FILL, MIXTURE OF SILTY SAND AND ASHES, a little gravel, black and brown		8		3	SB				
9½	FILL, MOSTLY ASHES, dark grayish brown		2		4	SB				
12	FILL, MOSTLY SILTY SAND W/GRAVEL, a little glass, dark brown and brown		9		5	SB				
			10		6	SB				
16	<div>End of Boring</div> <div>NOTE: Boring backfilled with grout from depth of 5' to surface</div>									

WATER LEVEL MEASUREMENTS

START 6-13-89 COMPLETE 6-13-89

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
6-13	3:25	16'	14½'	15'	to	None
6-13	3:30	16'	None	11½'	to	None
					to	
					to	

METHOD 3½" HSA 0-14½' @ 3:25

CREW CHIEF M. Crotty B-96

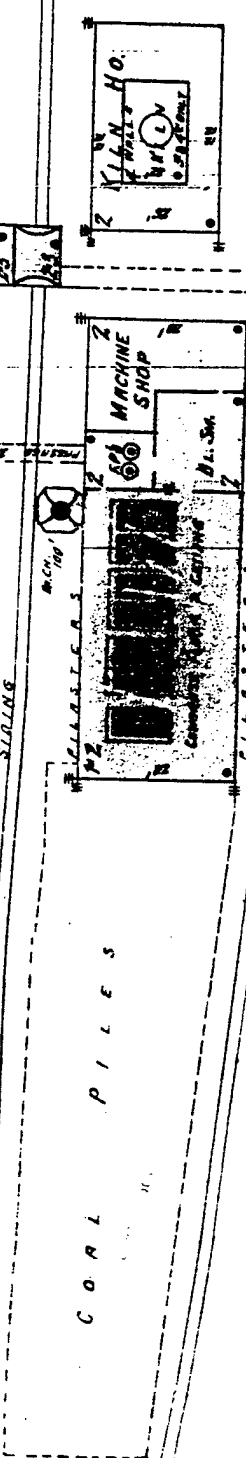
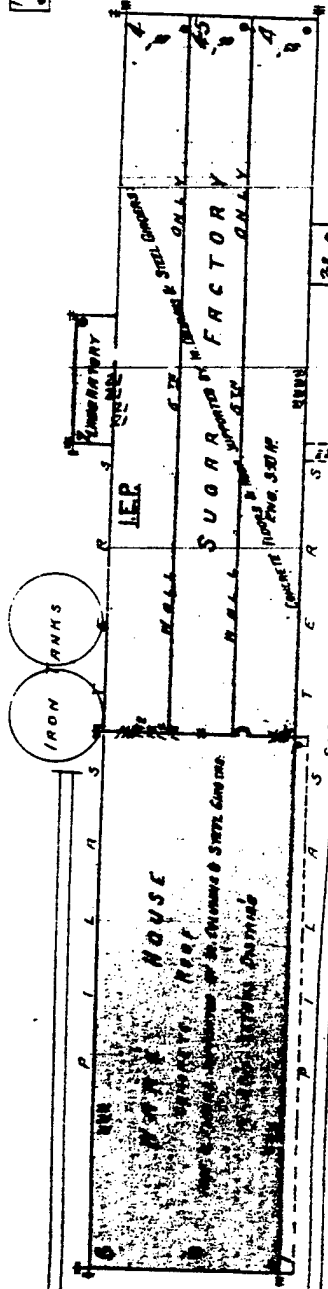
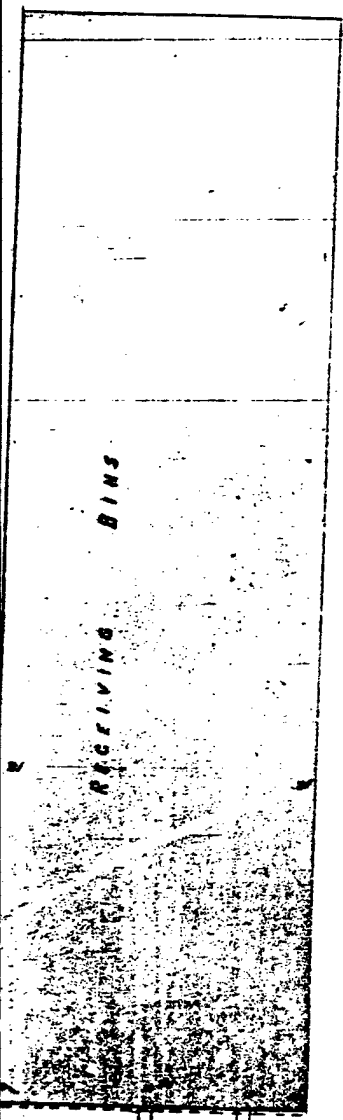
APPENDIX C

BEET

OPERATES 60 DAY
WATCHMAN ENTIRE
AROUNDS - LIGHTS E.L.
12 - 3 GALLON CANS
MAIN BUILDING QUARTERS
UNIT FIVE (NO. 5) WITH

LOC

On Storage



SIDING

TRAMWAY

Crystal Sugar
Factory
1910

1910

205

206

207

208

209

210

211

212

1ST ST.

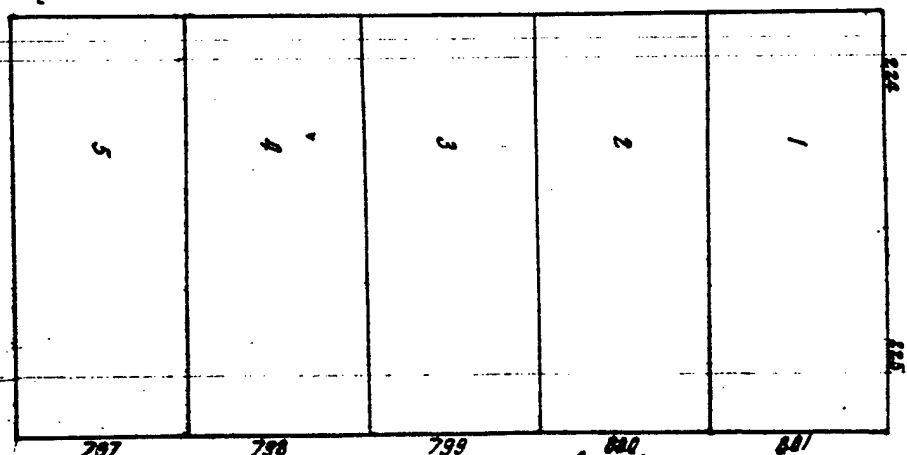
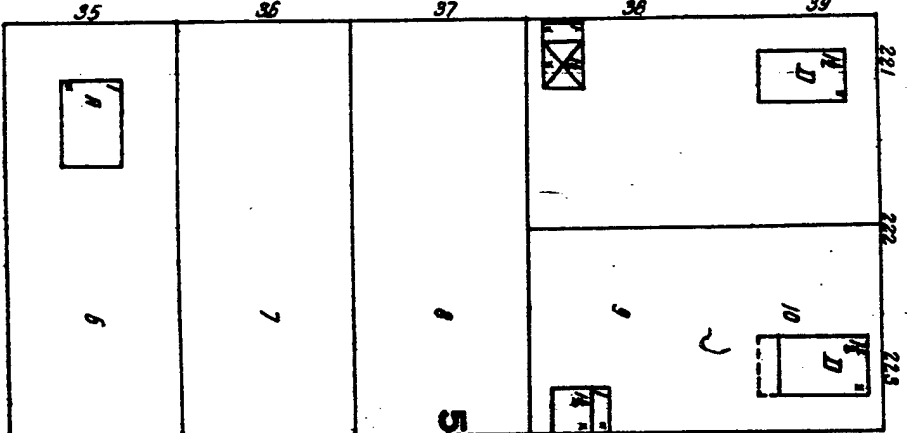
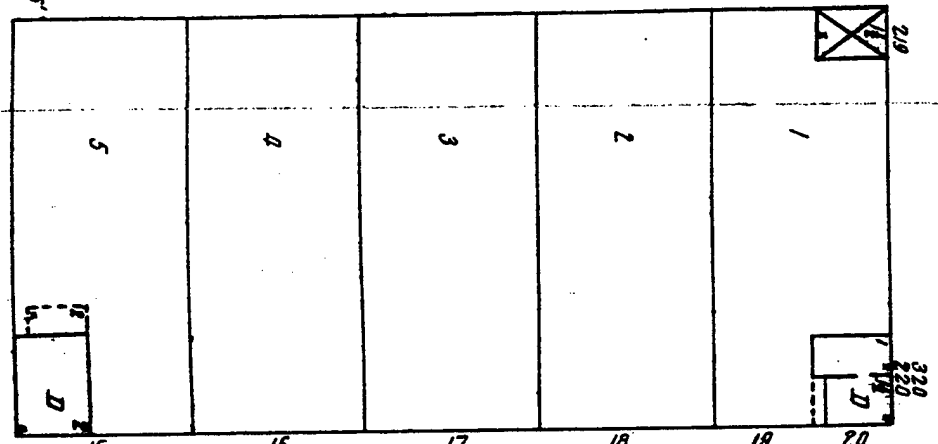
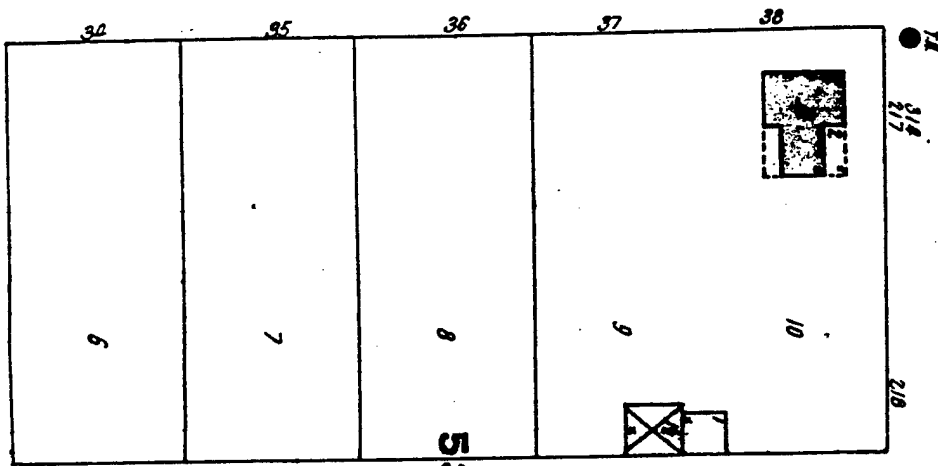
2ND ST.

3RD ST.

Chestnut

Chestnut

Walnut



LEVEE ST.

MINNESOTA

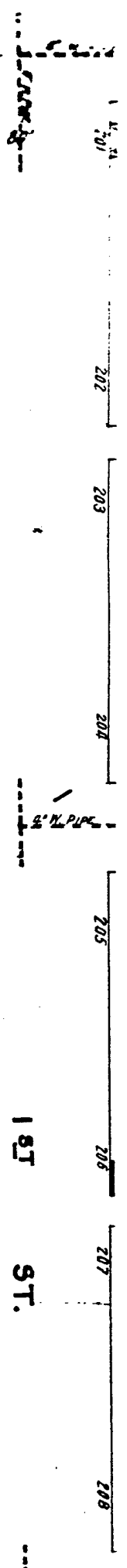
RIVER

BEYOND

Scale of Feet

Copyright 1911 by the Sanborn Map Co

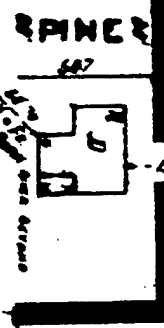
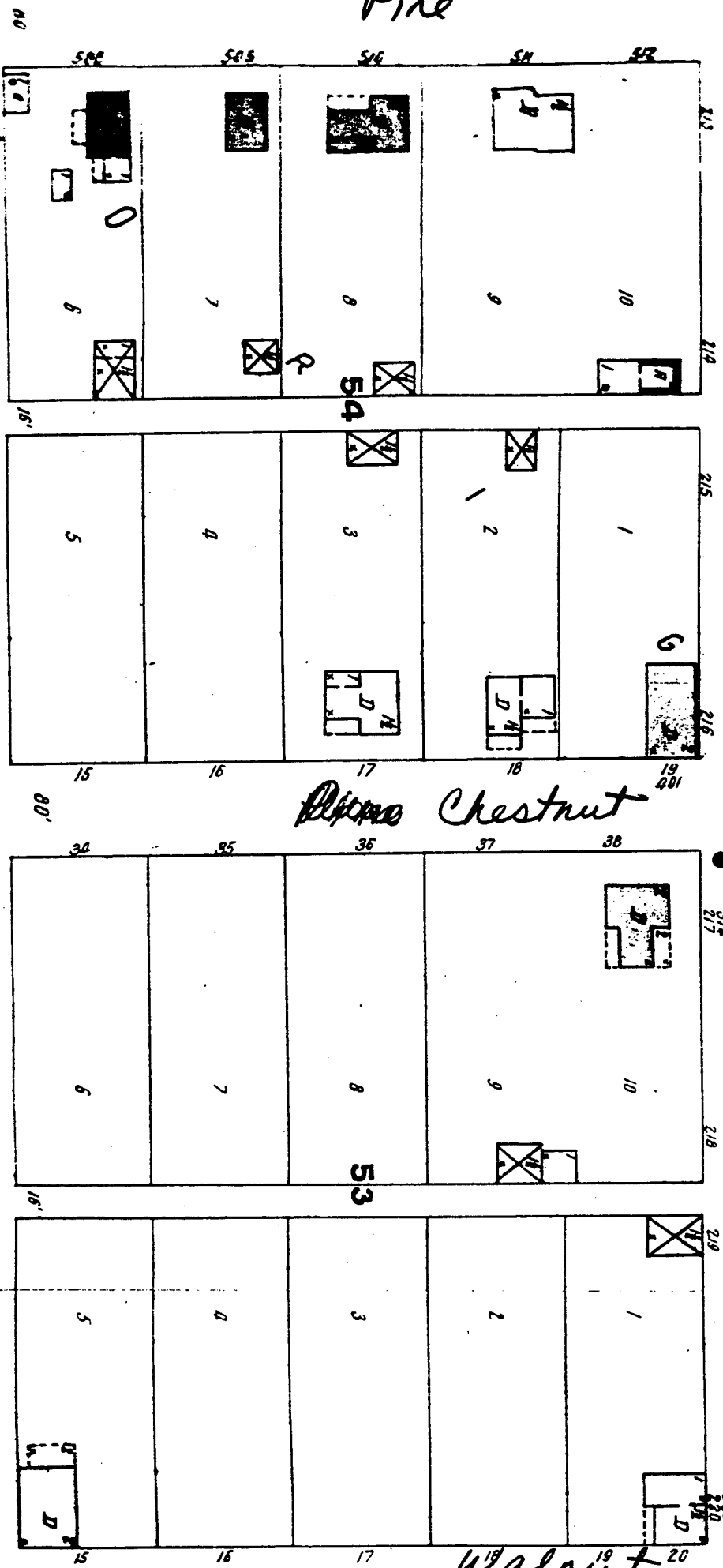
1911



Pine

~~Pine~~ Chestnut

Walnut



MINNESOTA RIVER BEYOND

LEEVE ST.

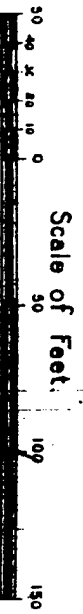
1911

1924

4/20/1924

(VACATED STREET)
FARM LAND BEYOND

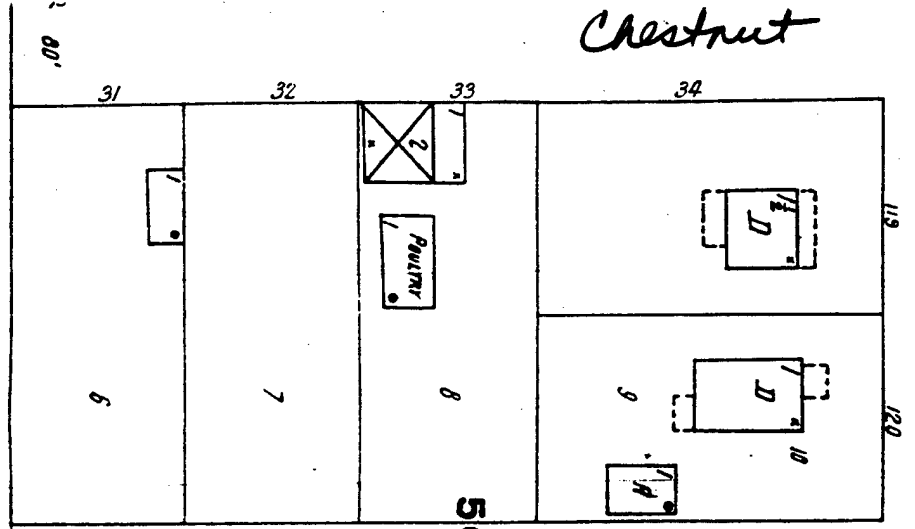
Mississippi River



1924

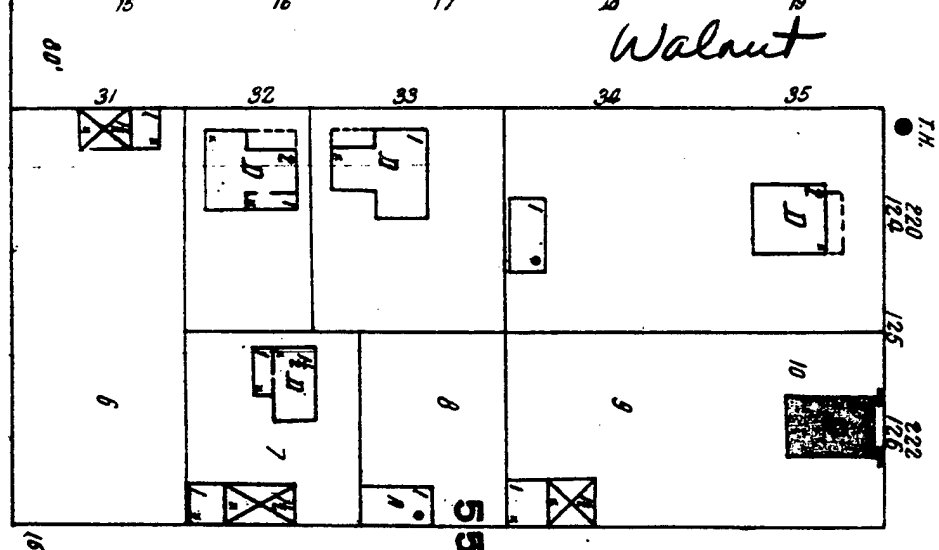
Large
St.

Chestnut

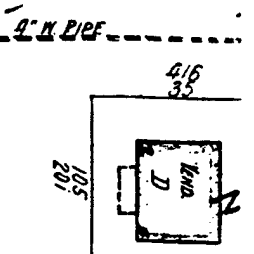


1 ST.

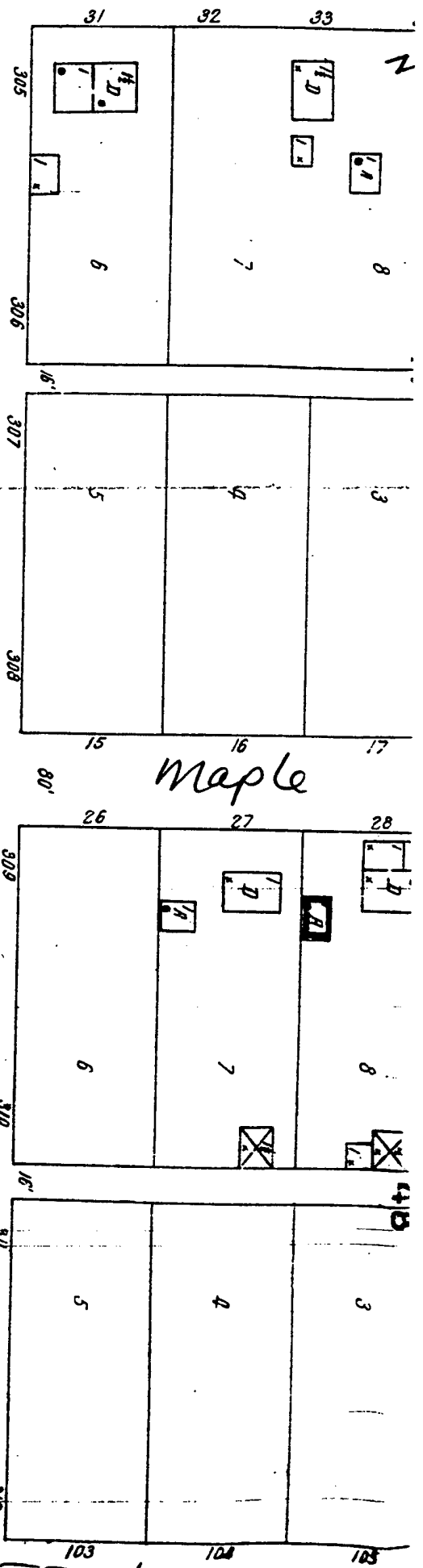
Walnut



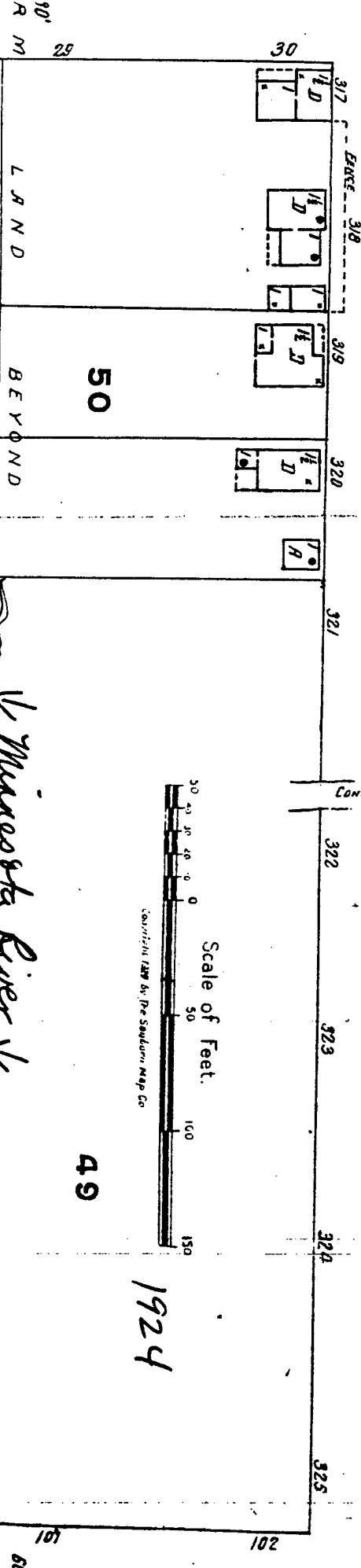
OAK ST.



ASH



1ST ST.



VACANT BEYOND

LAND

BEYOND

Minnesota River

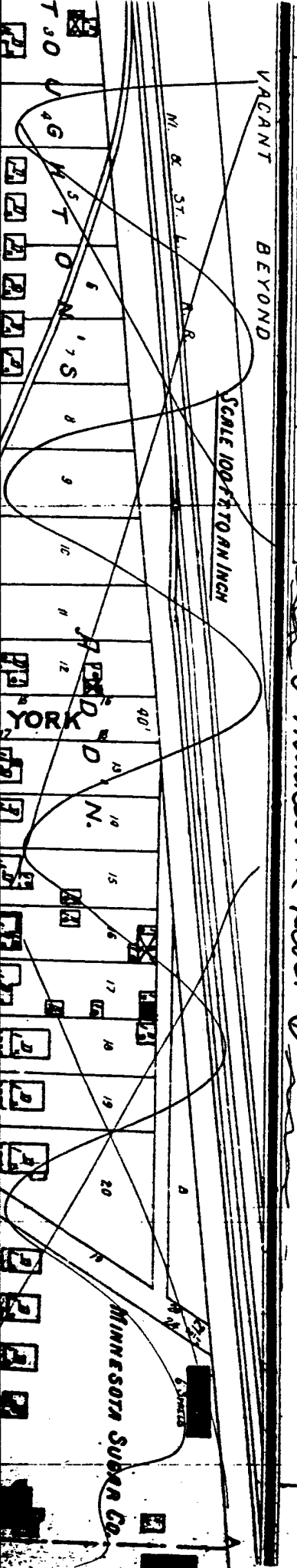
Scale of Feet.

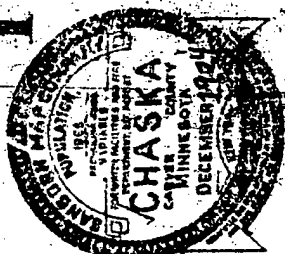
Copyright 1924 by The Standard Map Co.

1924

SCALE 100 FEET TO AN INCH

MINNESOTA SUBAR CO.





275-1217

See Drawing
118 20 120
Bar 1/2 inch

WATER RESOURCES

well water in the city of Chaska, Minn. is abundant. It is found in the sand and gravel layers which are underlain by a layer of clay. The water is of good quality and is used for domestic and industrial purposes. The city of Chaska has a water supply system which is operated by the Chaska Water Company. The water is pumped from the wells and distributed to the houses and businesses of the city. The water is of good quality and is used for domestic and industrial purposes. The city of Chaska has a water supply system which is operated by the Chaska Water Company. The water is pumped from the wells and distributed to the houses and businesses of the city. The water is of good quality and is used for domestic and industrial purposes.

FIRE DEPARTMENT

The fire department of Chaska, Minn. is organized on a full-time basis. It consists of a fire chief, a fire captain, and a number of firemen. The fire department is equipped with a fire engine, a fire truck, and a number of fire extinguishers. The fire department is responsible for the fire protection of the city of Chaska. It is also responsible for the fire protection of the surrounding areas. The fire department is a very important part of the city of Chaska. It is responsible for the fire protection of the city and its residents. The fire department is a very important part of the city of Chaska. It is responsible for the fire protection of the city and its residents.

INDEX

Block	Area	Population	Area	Population
1-10	15.43	101.15	1-10	15.43
11-20	15.43	101.15	11-20	15.43
21-30	15.43	101.15	21-30	15.43
31-40	15.43	101.15	31-40	15.43
41-50	15.43	101.15	41-50	15.43
51-60	15.43	101.15	51-60	15.43
61-70	15.43	101.15	61-70	15.43
71-80	15.43	101.15	71-80	15.43
81-90	15.43	101.15	81-90	15.43
91-100	15.43	101.15	91-100	15.43

NOTE: Some numbers show no address.

Scale 800 feet to an inch

Sanborn
Overview
1924

OLD CHASKA ST. PAUL (30)

STOUGHTON

AMERICAN BEET SUGAR COMPANY
MINNESOTA SUGAR COMPANY
BEET SUGAR FACTORY

CHASKA, MINN.
The American Beet Sugar Company, Minnesota Sugar Company, Beet Sugar Factory, Chaska, Minn. The factory is located on the east side of the city of Chaska, Minn. It is a large, modern building with a number of chimneys. The factory is operated by the American Beet Sugar Company. It is a very important part of the city of Chaska. It is responsible for the production of beet sugar. The factory is a very important part of the city of Chaska. It is responsible for the production of beet sugar.

APPENDIX D



① area between
Counthouse Lake
+ Minnesota River

② Sugar plant holding pond / berm

Chaska

1951
Aerial Photo

Stages 3+



98184 751

Chaska

Aerial Photo
1965

Stage 3

sugar plant
holding pond / ber.
O factory



Chaska Aerial Photo
1965

Stage 3

O sugar factory
+ holding pond / berm



Sewage treatment
plant + O apparent
dump area Chaska

Aerial photo
1965

Stage 4



aerial photo
Chaska
1965

area of ~~burial~~ sewage treatment
plant
O apparent dump site

Stage 4



Aerial
Photo

Chaska
1965

Stage 4

sewage treatment plant
& associated dump site

Crystal Sugar Plant in 1970

August 1970

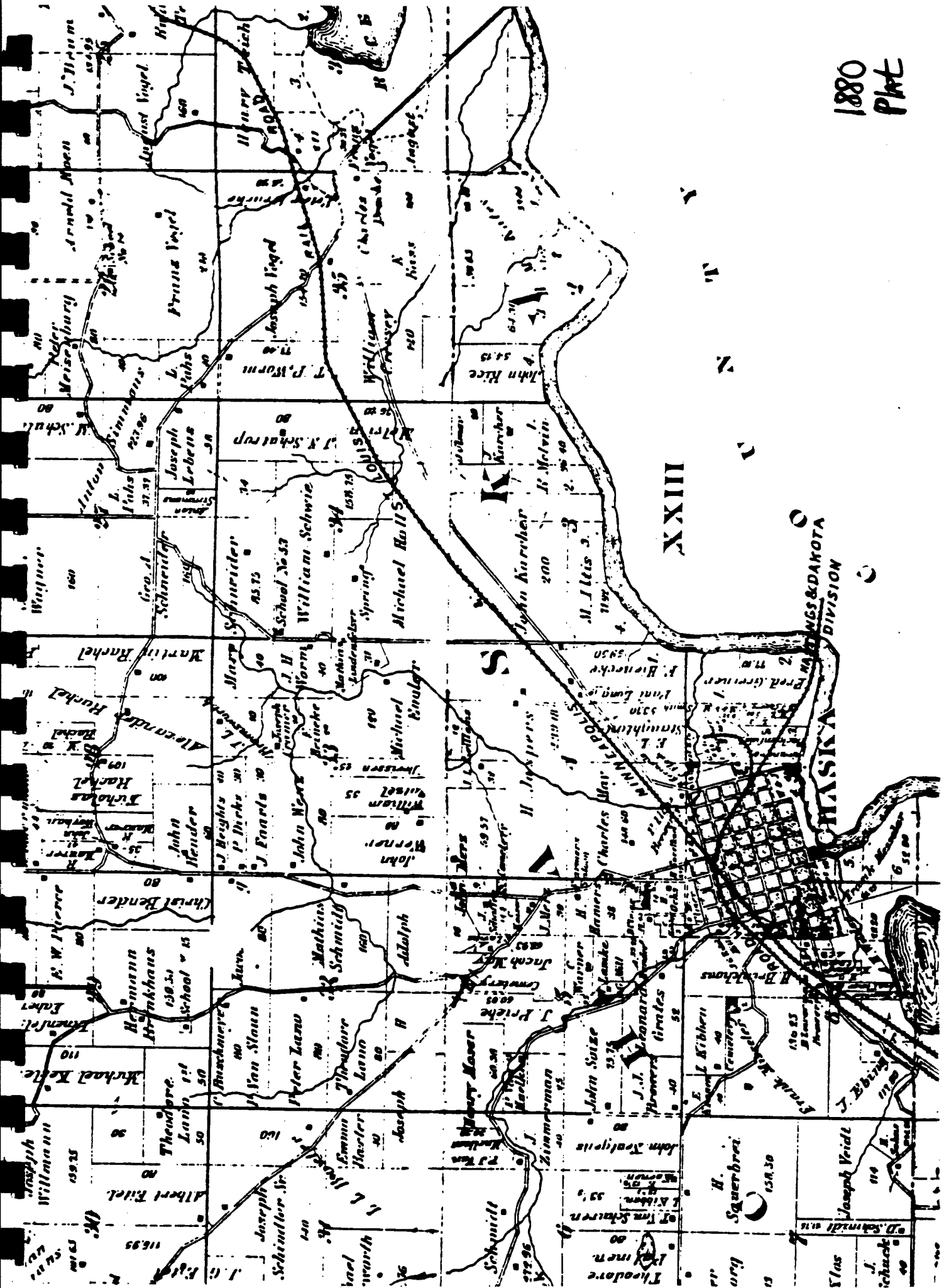


Crystal Sugar
factory & holding pond/berm

Aerial view of Crystal Sugar Factory, Alaska (1970) MHS

APPENDIX E

1880
Plat

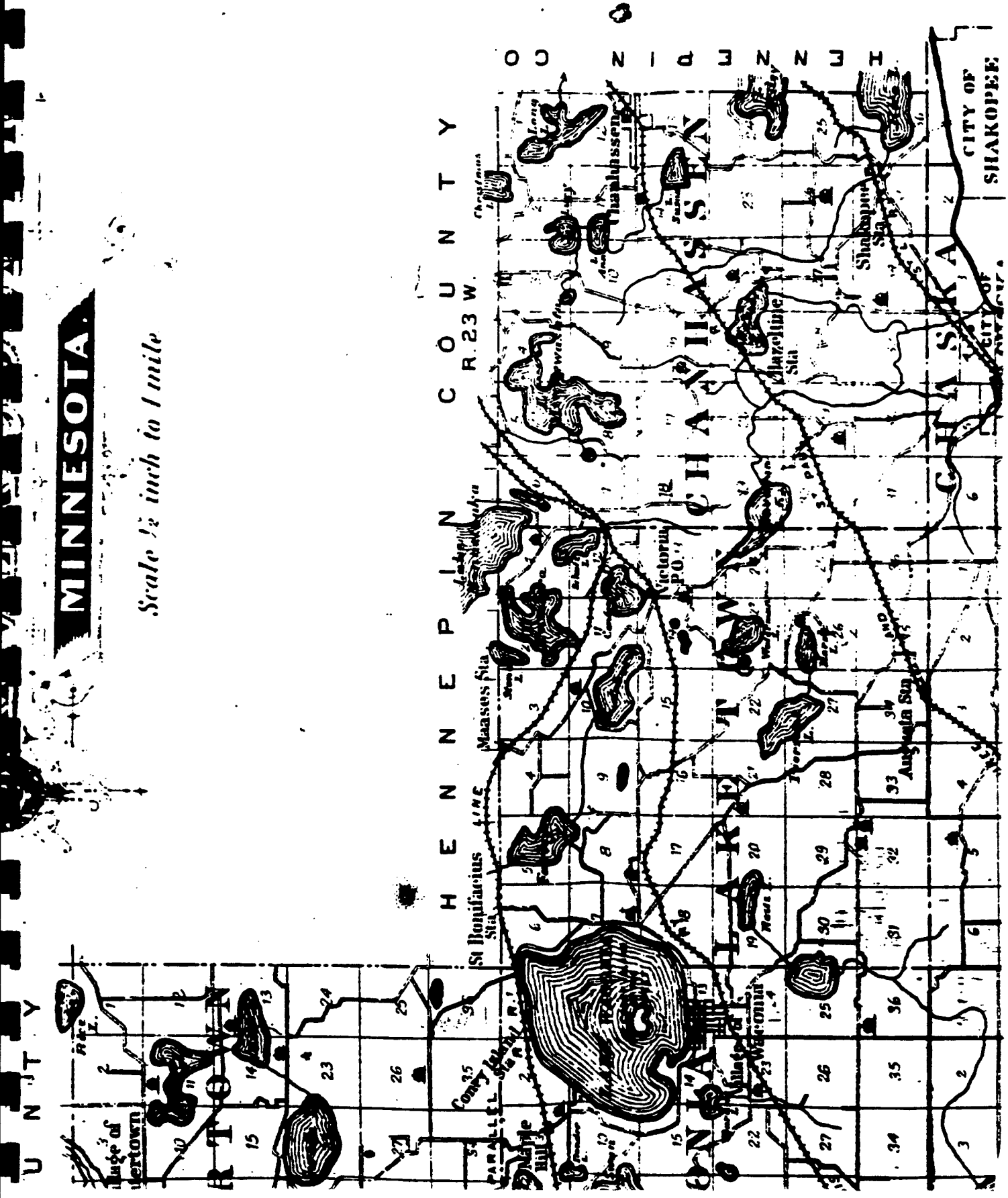


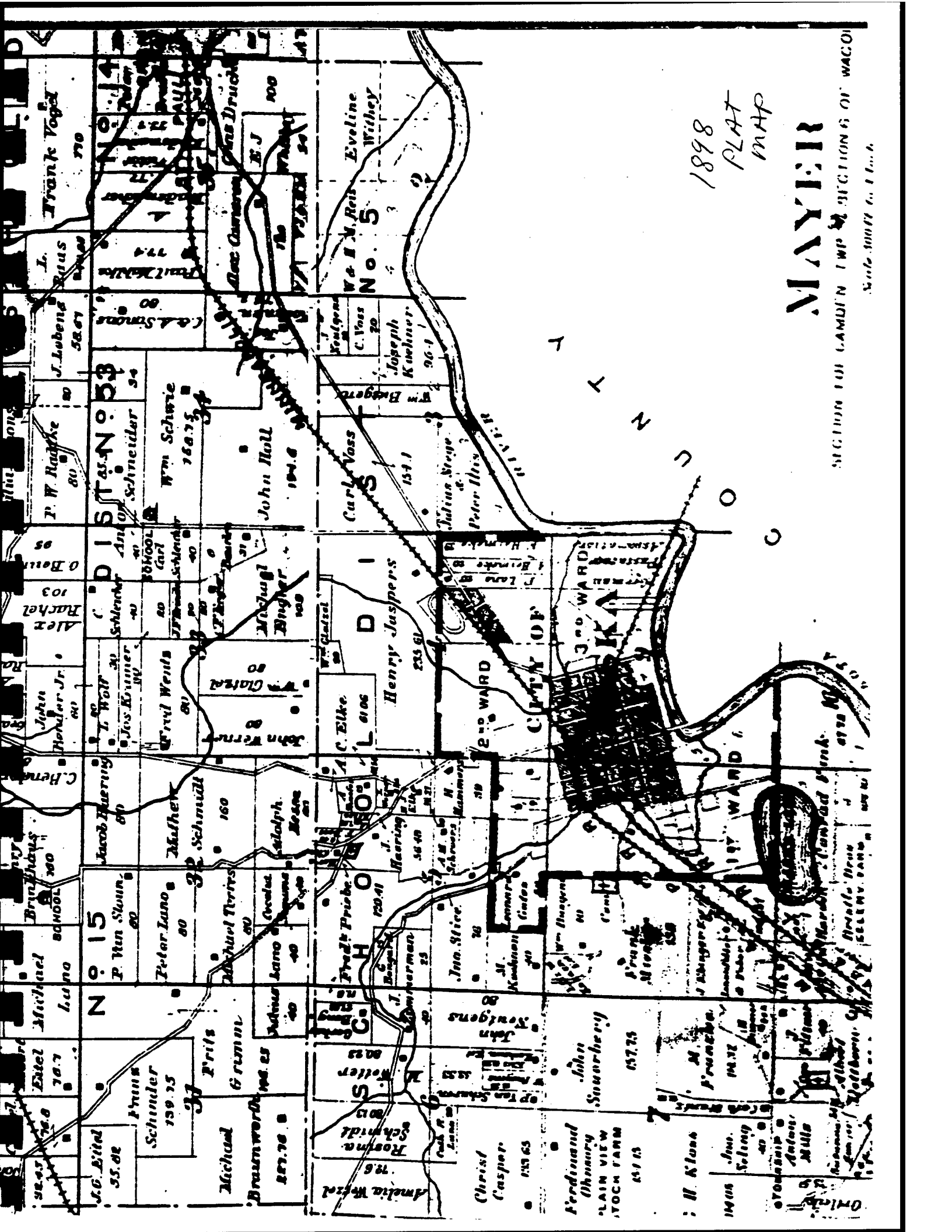
1890
P1A +
MAP

1890
p67

MINNESOTA

Scale 1/2 inch to 1 mile





MAYER

SECTION 101 CAMDEN TWP 2d SECTION 6 OF WAGON

Scale 3000 ft to 1 inch

1898

PLAT

MAP

Christ
Casper

Ferdinand
Ghannery
PLAIN VIEW
STOCK FARM

H. Kloss

John
Schling

John
Mills

John
Mills

John
Mills

John
Mills

John
Mills

John
Mills

John
Mills

John
Mills

John
Mills

John
Mills

John
Mills

John
Mills

John
Mills

John
Mills

John
Mills

John
Mills

John
Mills

John
Mills

John
Mills

John
Mills

John
Mills

BELT SUGAR FACTORY

[illegible]

0161

Sanborn

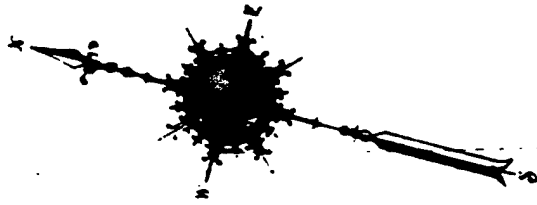
passive

Map

Detail

Located 1 1/4 Miles N.W. of Chaska P.Q.

one surface

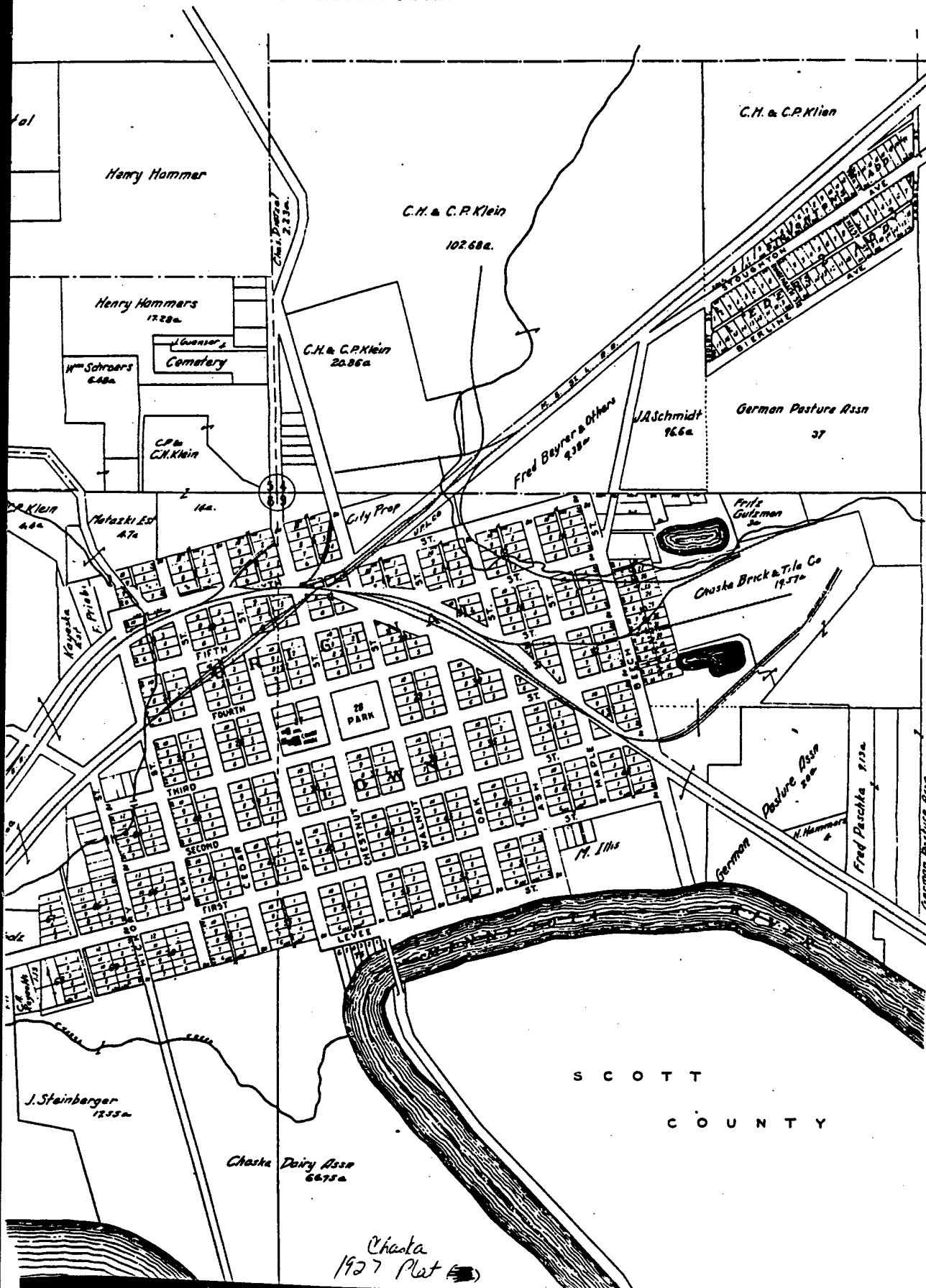


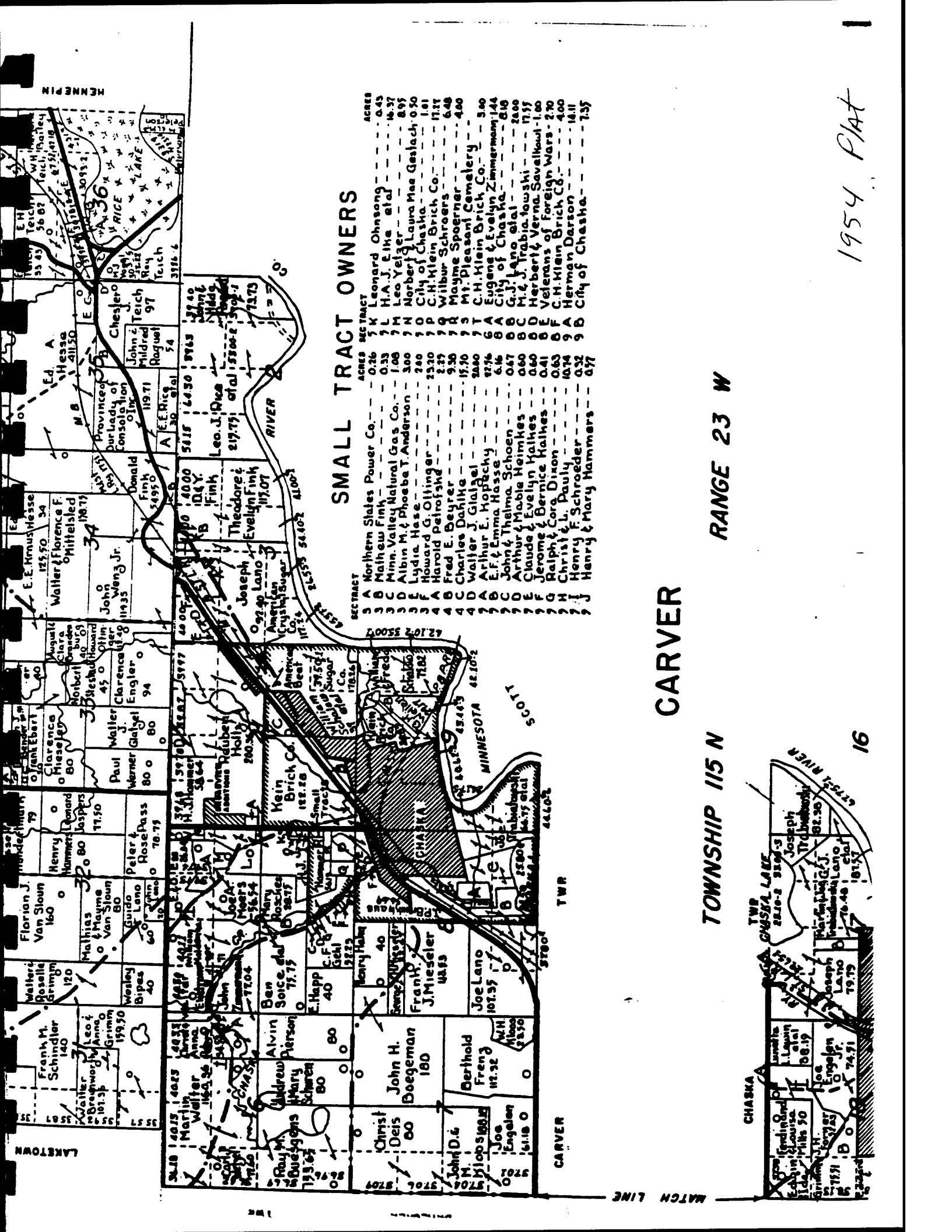
1910 Sanborn
Insurance Map
Detail of Crystal
Sugar Factory.

CITY OF
CHASKA
County Seat of Carver County
Scale 550 Feet to One Inch

1927 Plat Map
(6)

1927 Plat





SMALL TRACT OWNERS

TRACT	ACRES	TRACT	ACRES
1 A Northern States Power Co.	0.26	31 K Leonard Ohnsang	0.43
2 B Mathew Fink	0.33	32 L H.A. J. Elke et al	0.37
3 C Minn. Valley Natural Gas Co.	1.08	33 M Leo Yelzer	0.95
4 D Albion M. & Phoebe T. Anderson	3.00	34 N Norbert & Laura Mae Geslach	0.50
5 E Lydia Hase	2.00	35 O City of Chaska	1.81
6 F Howard G. Oltinger	23.20	36 P C.H. Klein Brick Co.	11.31
7 A Harold Petrofsky	2.25	37 Q Wilbur Schroers	6.48
8 B Fred E. Beyrer	9.50	38 R Mayme Spoerner	4.00
9 C Charles Dahlke	15.20	39 S M. Pleasant Cemetery	3.00
10 D Walter J. Glaziel	20.00	40 T C.H. Klein Brick Co.	1.44
11 E F. Emma Hase	6.16	41 U Eugene & Evelyn Zimmerman	1.44
12 F John & Thelma Schoen	0.67	42 V City of Chaska	2.10
13 G Arthur & Mable Heimkes	0.60	43 W G.L. Lano et al	2.00
14 H Jerome & Evelyn Halves	0.60	44 X Herbert & Verna Savell	1.00
15 I Ralph & Cora Dixon	0.41	45 Y Veterans of Foreign Wars	2.20
16 J Christ & L. Pauly	0.63	46 Z C.H. Klein Brick Co.	4.00
17 K Henry F. Schroeder	10.14	47 A Herman Larson	1.11
18 L Henry & Mary Hammers	0.32	48 B City of Chaska	7.35

CARVER

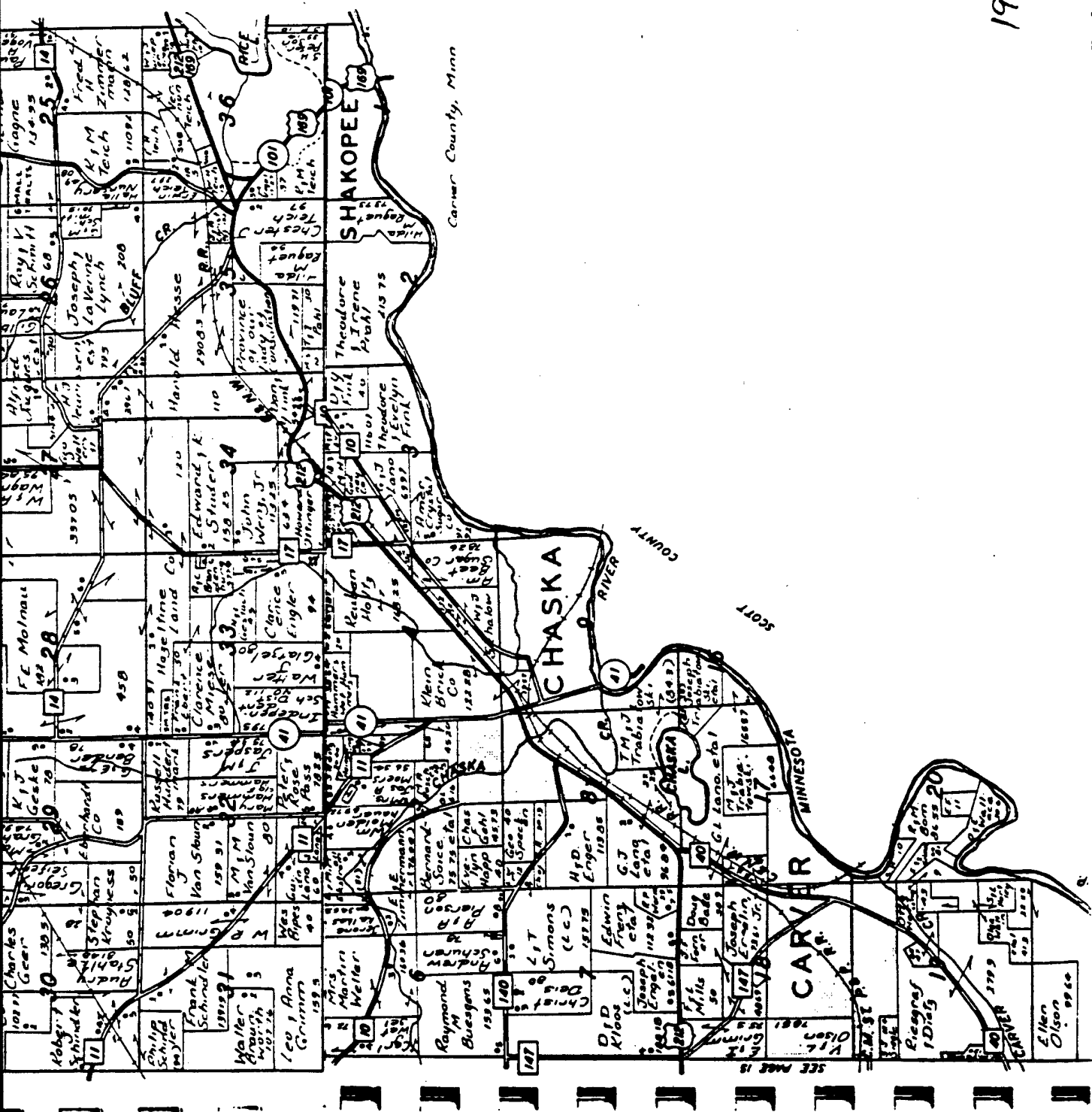
TOWNSHIP 115 N

RANGE 23 W

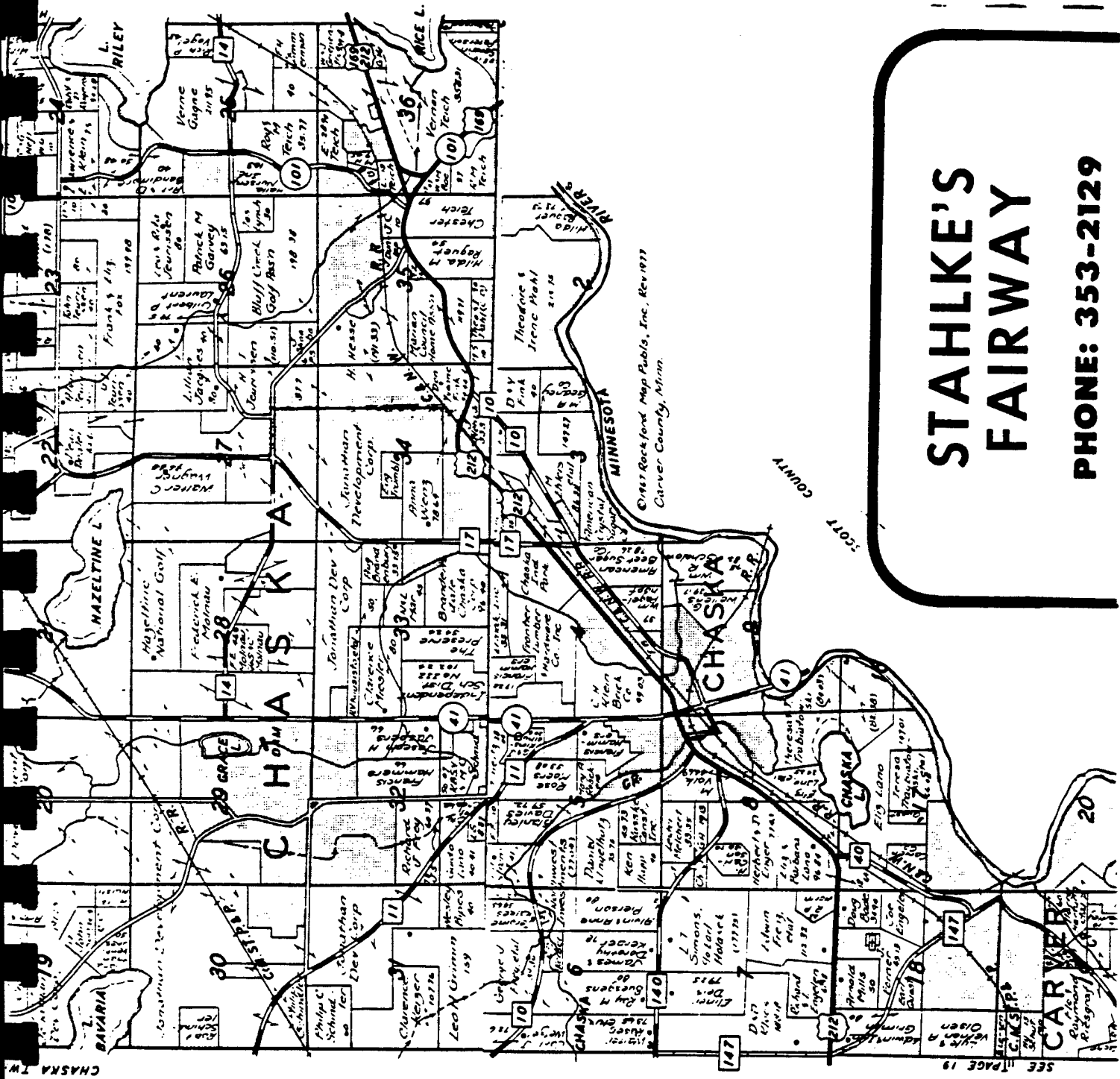
1954 Plat

16

1961
plat
map



1967 Plat



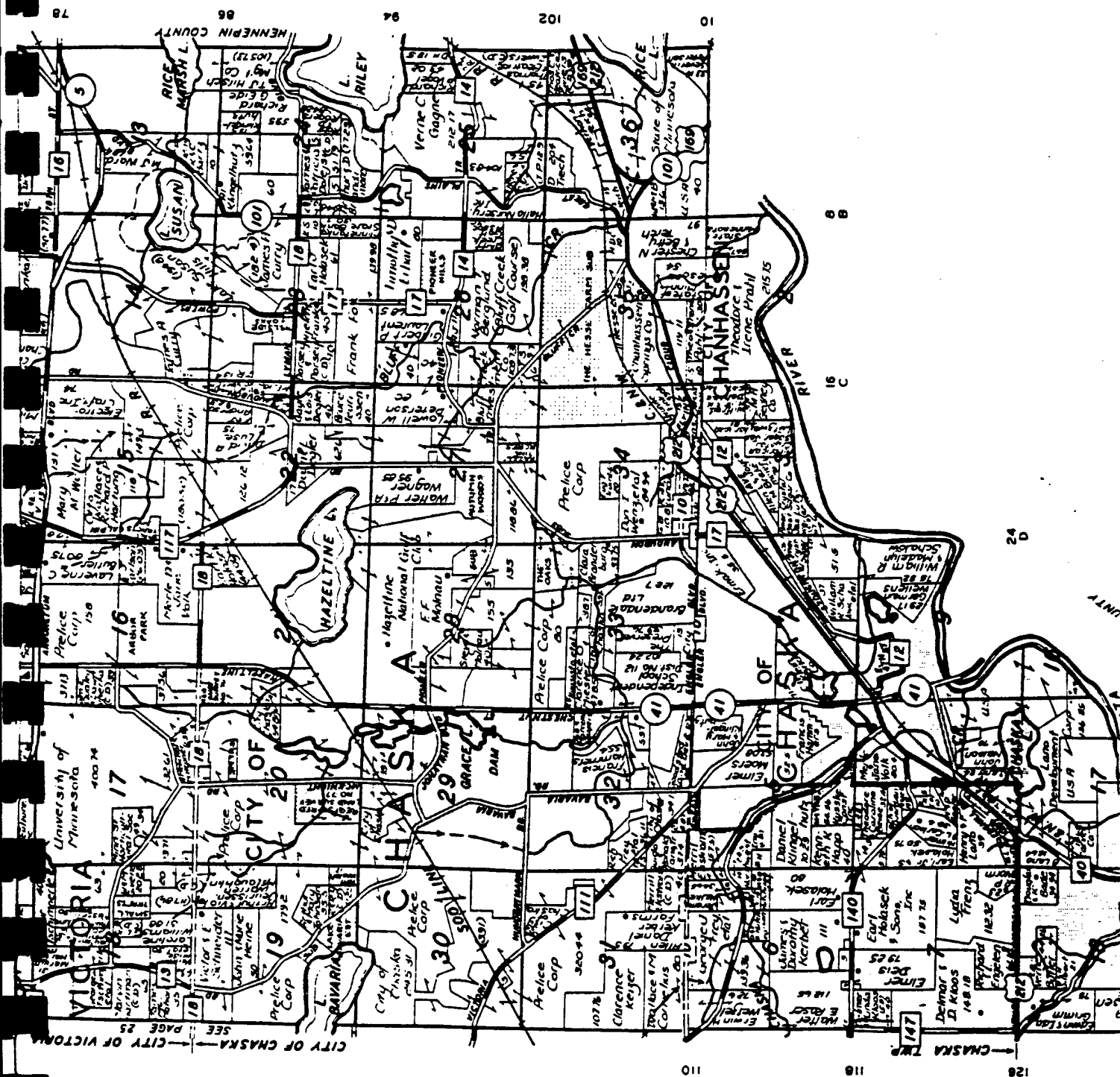
STAHLKE'S FAIRWAY

PHONE: 353-2129

©1977 Rockford Map Publ's, Inc. Rev 1977
Carver County, Minn.

1977
Plot

1987 Plat



AMERICAN CRYSTAL SUGAR COMPANY

CHASKA FACTORY



June 22, 1992

DEPARTMENT OF THE ARMY

St. Paul District, Corps of Eng.
180 Kellogg Blvd., Room 1421
St. Paul, Minnesota 55101-1479

Att: **Environmental Resources Branch**
Planning Division

Dear Mr. Whiting:

In response to your letter of June 15, 1992 requesting information regarding our present and past land use at Chaska.

The site highlighted in the aerial photograph is of an old lime pond used to discharge waste lime used in the processing of sugar beets. The processing of sugar beets was discontinued in 1971 and the facility has since been used as a liquid sugar and bulk sugar distribution center.

The parcel of land was sold in 1978 to James Lutzweiler who in turn sold the land to Johnson and Haifel in I believe 1986.

If you have any further questions, please call Bob Aune at our Chaska office, 448-2811.

Sincerely,

A handwritten signature in dark ink, appearing to read 'Robert D. Aune', written over a large, loopy flourish.

Robert D. Aune
Distribution Facility
Manager

Description
of Sugar
Beet Processing
Operations

from Informational
Booklet written
& published
by Crystal Sugar, Inc.
at
Minnesota
Historical
Society Library

This booklet has been prepared by American Crystal Sugar Company to acquaint you with the history of sugar and give you the highlights in the production of beet sugar, an all-American product. It describes briefly, in simple terms, the operations of each station, or phase of the operation, in order that you may learn more about the production of this valuable, yet inexpensive energy food which plays such an important part in the American diet.

Brief Description of the Process

No. 1. Wet Hopper and Beet Storage—

The beets as received are unloaded for immediate processing from the hopper bottom gondola cars or trucks into the wet hopper. This has a flume of rapidly moving water which conveys the beets into the factory and gives them a preliminary washing. Beets in excess of the factory demands are piled and later removed from the piles to the wet hopper. In territories where severe freezing occurs early, the harvest is expedited to such an extent that large piles of many thousands of tons of beets are accumulated before processing.

No. 2. Wash House—

The beets from the flumes, on entering the factory, pass through rock catchers and a weed catcher to remove foreign material. They are then lifted out of the flume water by the beet wheel or scroll, and dumped into the beet washer and thoroughly washed with fresh water. Leaving the washer, they are elevated into a hopper on an upper floor.

No. 3. Cutter Floor and Scales—

The washed beets, after being elevated, are usually weighed through automatic scales into large hoppers from which they are fed into the beet cutters and sliced into thin slices approximately $\frac{3}{32}$ " square and 3 or 4 inches long. These slices or cosettes, which resemble thinly sliced shoestring potatoes, are conveyed to the diffuser where the sugar is extracted. Each of the slicers is equipped with 48 ridged knives which must be sharpened and reset at frequent intervals. These knives are filed by automatic sharpening machines on this station.

No. 4. Diffusion - Continuous or Batch—

The sliced beets (cosettes) are conveyed to the diffuser, and in the case of the continuous diffuser, are weighed automatically by the pressure they exert on a calibrated belt. The continuous diffusers are an elaborate arrangement of enclosed conveyors and screens where the cosettes are moved continuously through the diffuser from the entering end to the discharge (pulp) end. The batch diffusers consist of a number of cells or tanks arranged for filling each cell individually and consecutively. Water is introduced at the pulp end, and as it circulates counter-currently through the cosettes toward the last cell filled, it gradually accumulates more and more sugar in solution until, when it leaves the diffuser, it will contain 10% to 13% sugar. This is called raw juice. The pulp, which is substantially exhausted of sugar, goes either to the pulp dryer or to silos to be used for cattle feeding purposes.

"The Production of Sugar From Sugar Beets"
(1954) American Crystal Sugar Company

P
377
76
542
No. 5. Pulp Dryer—

Nearly all of our factories dry the beet pulp. After the sugar has been extracted from the beets in the diffuser, the residue, beet pulp, is conveyed to the pulp presses where as much water as possible is pressed out of the pulp. The pressed pulp then enters the pulp drying drums where it is dried by direct contact with hot air from the fuel fired furnaces. The dried pulp may be mixed before drying with molasses according to market demands. Whether mixed with molasses or not, it is bagged and sold to stock and dairy farmers as a high nutrition feed.

No. 6. Lime Kiln—

The raw juice from the diffuser requires lime for purification and the large quantities of burned lime needed are produced by burning lime rock and coke in vertical lime kilns. The by-product, carbon dioxide gas, is also utilized in the carbonation process.

No. 7. Slaker Room or Steffen Process—

Approximately half of the factories are what we refer to as non-Steffen houses, and in such factories the burned lime as it leaves the kiln is conveyed to the lime slaker, a large revolving drum, and slaked to a milky consistency, free of sand and dirt, by constantly agitating the lime in the presence of hot water. The resulting "milk of lime" is pumped to the refining process as needed. In the Steffen's factories, the molasses from the process, which contains approximately 50% sugar that will not crystallize, is diluted, and finely ground lime powder is added to this solution. The lime combines with sugar and the solution is filtered. The resulting cake is washed free of impurities and then introduced into the process as a saccharate. This enables the recovery of sugar from the molasses and at the same time supplies the necessary lime for process.

No. 8. First, Second, and Third Saturations—

The raw sugar juice, which is the product of the continuous or batch diffusion, and which contains some non-sugars, is brought to these stations and treated with milk of lime, carbon dioxide gas, and sulfur dioxide gas under carefully and automatically controlled conditions of temperature and alkalinity, in such a manner that substantial amounts of the soluble non-sugars and coloring matter may be precipitated and removed by subsequent settling and filtration.

No. 9. First Carbonation Filters—

Where rotary filters are used the juice from the first carbonation enters the Dorr clarifier where the lime and non-sugars from the first carbonation station are allowed to settle out. The clear juice continues in the refining process while the solids which have settled out are picked up on vacuum filters, washed to remove all traces of sugar, and then discharged to the lime storage pond. Other types of filters known as Kellys, and also plate and frame filters, are sometimes used, in which cases the Dorr clarifier is not used.

No. 10. Plate and Frame Filters—

The clear juice, leaving carbonation filters or the Dorr clarifying tank, is further chemically treated at the second and third saturation

220003

stations and then brought to the plate and frame filters for filtration through closely woven cotton duck cloths. This same type of filter is also used for a "polishing" filtration of the high grade sugar liquors after evaporation to remove all traces of suspended matter before the sugar is crystallized by boiling under a high vacuum.

No. 11. Evaporators—

The juice resulting from the purification process is a thin syrup containing from 12% to 14% sugar and about 85% water. The function of the evaporators is to remove a large portion of this water by as inexpensive means as possible. The steam heating the first evaporator is the exhaust steam from the turbo-generator after generating the factory power and light. The vapors produced by the boiling in the first evaporator heats the second, and each succeeding evaporator is heated economically by vapors from the preceding one. Various "vapors" or low-grade steam from these evaporators are also used in other portions of the process for heating and boiling.

No. 12. Vacuum Pans—

The double filtered and evaporated thick juices are brought to the pan floor for boiling into the final product—sparkling white CRYSTAL SUGAR. This boiling must be done at a low temperature to prevent caramelization; therefore, the boiling is carried out in steam heated vacuum pans. The syrup is drawn into the pan and boiled to the point at which the sugar starts to crystallize. After small crystals of sugar are formed, the speed and length of boiling are carefully controlled to give an end product of just the right sized crystals for the homemaker's consumption.

No. 13. Centrifugals—

All sugars as they leave the vacuum pan are surrounded with a film of thick syrup or molasses. This film of syrup is removed by running the mixture of sugar and syrup into a rapidly spinning screened basket called a centrifugal. The screen retains the sugar crystals and permits the syrup to be spun off. Final traces of this syrup are then washed from the sugar with a fine spray of hot water and steam. The screen baskets revolve up to 1,600 revolutions per minute and the centrifugals are equipped with automatic timers that regulate the speed, length of time of spinning, amount of wash water used, turn off the power and apply the brake when the spinning is completed.

No. 14. Granulators—

The white CRYSTAL SUGAR after it is boiled and separated from the adhering syrup and washed, requires drying before it is sacked. This drying is done by tumbling the sugar through a drum in the presence of dry, hot air. This dryer is called a "granulator" because it is used in the drying of granulated sugar.

No. 15. Crystallizers—

To further the crystallization of sugar from the lower grade syrup after successive vacuum pan boilings, the lower grade "fillmass" is cooled by holding it in a water cooled crystallizer. This cooling and time period is regulated to obtain maximum yield of sugar.

No. 16. Sugar Warehouse—

The CRYSTAL SUGAR leaving the granulator is sized by screening and is then conveyed to the sugar sacking station. After sacking, the sugar is either sold or transferred to the sugar warehouse for storage until sold. The humidity and temperature of the air in the warehouse is controlled to eliminate caking.

No. 17. Laboratory—

At each plant a well equipped laboratory with trained personnel maintains a close chemical control at various stages of the process in order to insure efficient operations. The various analyses are made at frequent intervals to assure maximum quality of sugar and reduce processing losses to a minimum.

No. 18. Boiler House—

All the steam for the power plant and process is produced in the boiler house. Equipment varies considerably, and for each 2,500 tons of beets processed, it will require approximately 400 tons of coal or the equivalent in gas, oil, or lignite.

No. 19. Power Plant—

Equipment varies widely among the factories, but for the most of them, we use turbo-generators to produce the electricity for the factory motors, lighting, etc.

No. 20. Machine Shop—

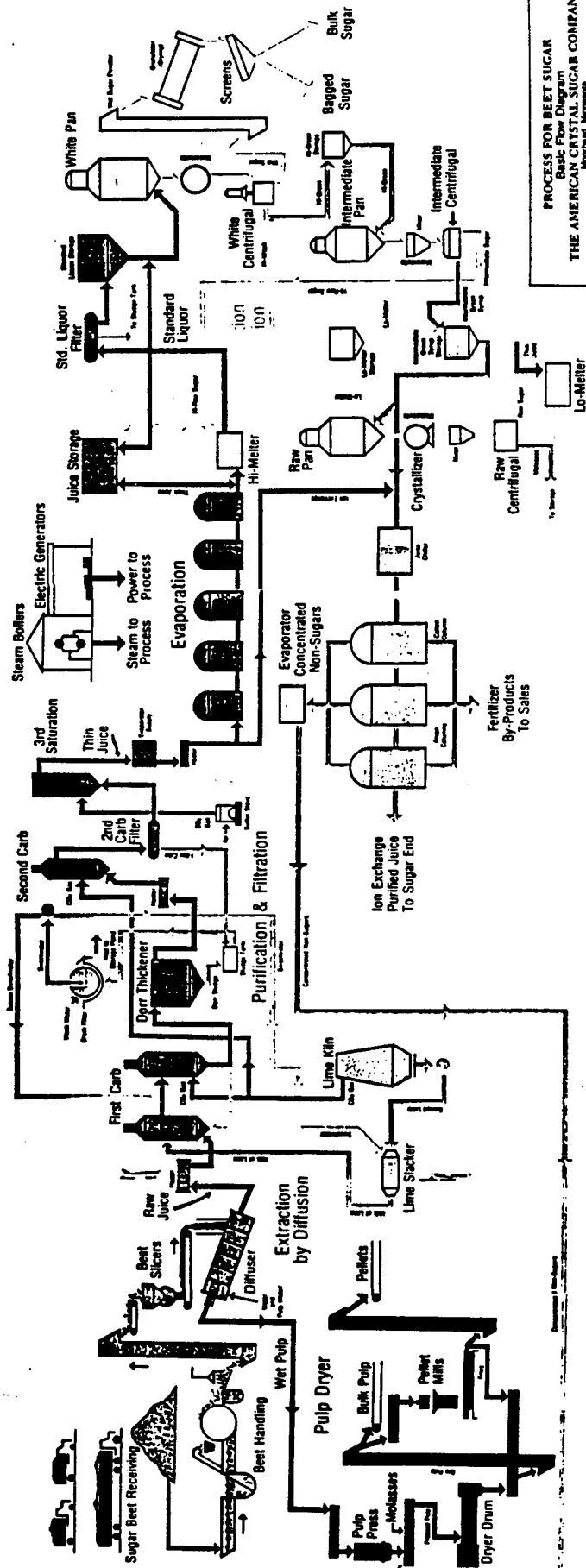
To insure prompt processing of the perishable beet crop, the Company maintains fully equipped and manned welding and machine shops to make emergency and routine repairs.

We hope you have enjoyed and profited from your visit through one of the American Crystal Sugar Company's ten modernly-equipped plants which are located in widely separated agricultural areas.

We also hope that when you think of sugar it will be in terms of CRYSTAL SUGAR and the circle brand that identifies this uniform, dependable, high quality food suitable for all purposes for which sugar is used.

BUY CRYSTAL SUGAR

"NOTICE: This material may be protected by copyright law (Title 17 U.S. Code)"



PROCESS FOR BEET SUGAR
SUGAR FACTORY OF THE
THE AMERICAN CRYSTAL SUGAR COMPANY
MONTICELLO, MINNESOTA

APPENDIX F



Minnesota Pollution Control Agency

Celebrating our 25th anniversary and the 20th anniversary of the Clean Water Act

July 21, 1992

Mr. Richard Miller
U.S. Army Corps of Engineers
180 East Kellogg Blvd.
St. Paul, Minnesota 55101

Dear Mr. Miller:

RE: Property Transfer File Evaluation

This letter is in response to your request regarding environmentally contaminated sites in the vicinity of The Levee Work in Chaska, Minnesota. We understand that U.S. Army Corps of Engineers is requesting information regarding the above-referenced property.

Regarding your request, the Minnesota Pollution Control Agency (MPCA) staff has conducted a limited file evaluation for the referenced property or other properties in a one mile radius. The file evaluation included the review of the following:

- (1) EPA - National Priorities List (NPL);
- (2) EPA - Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS);
- (3) MPCA - Permanent List of Priorities (PLP);

List (1) and (3) are the respective federal and state Superfund lists. Sites on these lists are added and deleted by a specific administrative process. Sites on these lists have confirmed contamination and are undergoing various stages of investigation and remediation. List (2) is a national inventory of suspected or confirmed hazardous waste sites. Sites on this list that warrant further investigation or remediation are candidates for further enforcement action under the state and/or federal Superfund programs.

- (4) MPCA - Regulatory Compliance, Hazardous Waste Enforcement Log;
- (5) MPCA - List of Permitted Solid Waste Facilities;
- (6) MPCA - Hazardous Waste Permit Unit Project Identification List;
- (7) MPCA - 1980 Metropolitan Area Waste Disposal Site Inventory;
- (8) MPCA - 1980 Statewide Open Dump Inventory; and
- (9) MPCA - Property Transfer Technical Review Data Base.

Data bases (4) through (9) are used by the MPCA to track various categories of sites. Data base (4), (5), and (6) identify facilities that handle solid or hazardous wastes and may not have experienced any releases. For data bases (7) and (8), releases of contaminants at particular sites may not be yet confirmed or file information is limited. Data base (9) is a registry of properties at which a voluntary investigation has been or is being conducted, with MPCA staff

Mr. Richard Miller

Page 2

July 21, 1992

providing technical review of the investigation and any necessary remedial activities. A number of these properties have been investigated and cleaned up or found to not require any cleanup work.

We have no listings under the area indicated for the property. However, our file evaluation has revealed that the following sites are within a one-mile radius of the referenced property:

- Carver Dump, at the end of Main Street, north bank of the Minnesota River, Carver (7); (T115, R23, Sec. 17, Sw 1/4 of Sw 1/4 of NE 1/4, & Sw 1/4)
- Carver Highway Dept. Dump, between Edgehill Drive and County Road 140, Chaska (7);
- American Crystal Sugar Abandoned Surface Impoundment Site, southeast of the Bierling Avenue and Bold Street intersection, (1070 Stoughton Avenue), Chaska (7);
- Gedneys Pickle Factory Surface Impoundment Site, between Highway 212 & 6th Street, approximately the 11800 block, Chaska (7); and
- Chaska Dump Site, between Willow Street and Beech Street, on the north side of the railroad tracks, Chaska (7).

The file evaluation also included an information retrieval from the Underground Storage Tank Information System data base, which contains information about underground storage, leaks, and spills of petroleum products and/or hazardous substances. It is managed and updated continuously by MPCA staff. Enclosed are:

- A list of leaking underground storage tanks reported within the 55318 zip code area; and
- a list of hazardous substance and/or petroleum product spills that have been reported in Chaska and Carver.

We suggest that you also contact the cities of Chaska and Carver or Carver County regarding the location of pipelines, underground storage tanks, and possible spills of petroleum products and/or hazardous substances which may have occurred in the area.

For concerns regarding Leaking Underground Storage Tanks or Spills of petroleum products and/or hazardous substances reports, please refer to the enclosed "Leak/Spill and Underground Storage Tank File Request Form."

If you have questions regarding sites reported on the following lists, please contact the staff person listed below:

(7/8)	Metro and Statewide Open Dump Inventory	Chris Malec	612/297-5177
(9)	Property Transfer Technical Review	Gerald Stahnke	612/297-1459

Mr. Richard Miller

Page 3

July 21, 1992

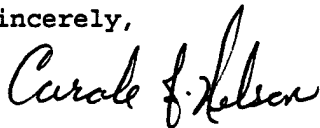
This letter does not constitute an assurance on the part of the MPCA or the state of Minnesota that the property in question is free of any hazardous substances, pollutants, contaminants, or other conditions which may adversely affect the public health, welfare or the environment.

Please be aware that the information provided in this letter is submitted pursuant to the Minnesota Data Practices Act, Minn. Stat. ch. 13 and is not intended to relieve from liability any persons who may otherwise be liable under any provision of state or federal law or regulation. Nor is this letter intended to relieve any persons from responsibility they may have to investigate property prior to becoming involved in a transaction relating to that property. Lastly, you should be aware that the absence of information on a particular parcel of property does not necessarily mean that there are no problems connected with this property.

Minn. Stat. §c 115B.17, subd. 14 (1992) requires that a person requesting this assistance pay the MPCA's cost of providing the assistance. The charge for this file evaluation is \$90.00, which includes two hours spent by staff at a rate of \$45.00 per hour. A bill for this and any other assistance provided this month will be mailed to you at the end of the month.

If you have any questions regarding this letter or if you would like to review our files, please call me at 612/297-1796.

Sincerely,



Carole J. Nelson
Property Research Specialist
Program Development Section
Ground Water and Solid Waste Division

CJN:kra

Enclosures

MINNESOTA POLLUTION CONTROL AGENCY
HAZARDOUS WASTE DIVISION
TANKS & SPILLS SECTION

City Leaksite List for Zip Code: 55318

Report Date: July 09, 1992

Facility	Staff Person	ID #
CARVER COUNTY COURTHOUSE		5318
600 E 4TH ST	Miller, Sandra	
CHASKA 55318		1838
CHASKA TIRE PLUS	Kopltitz, Mark	
113 E 6TH ST		5326
CHASKA 55318	Milless, Donald	
CHASKA TRUCK STATION BUILDING #90921		4822
1390 STATE ST	Kopltitz, Mark	Closed
CHASKA 55318		5155
HAZELTINE NATIONAL GOLF CLUB		3927
940 PIONEER TRAIL	Holst, David	
CHASKA 55318		1133
HOLMAN STEEL ERECTION COMPANY	Moeger, John	Closed
3220 TERMINAL DRIVE		1092
EAGAN 55318		4625
JOES TIRE AND GAS	Berryhill, Janet	
Hwy 25 & COUNTY RD 10		3859
WATERTOWN 55318	Moeger, John	
KALLSTEAD DIAGNOSTICS		981
1000 LAKE HAZELTINE DR	McLain, Chris	
CHASKA 55318	Berryhill, Janet	2660
LEES UNION 76		Closed
Hwy 212 & 41 - 104 Hwy 212E		2429
CHASKA 55318	Berryhill, Janet	
M A GEDNEY CO		4732
2100 SToughton Ave	Kopltitz, Mark	Closed
CHANHASSEN 55318		309
MID-AMERICA BANK	Berryhill, Janet	
12775 COUNTY RD 43		Closed
CHASKA 55318		
O PETROLEUM		
650 CHESTNUT ST N		
CHASKA 55318		
QUALI TECH INC		
318 LAKE HAZELTINE DR		
CHASKA 55318		
SALDEN SCHOOL BUS SERVICE INC		
402 W 6TH ST		
CHASKA 55318		
STOCKWOOD CONDOMINIUM ASSOCIATION		
110251 VILLAGE RD		
CHASKA 55318		
VALLEY OIL		
423 CHESTNUT ST		
CHASKA 55318		

----- End of Report -----



Oil Notifications

Emergency Response Notification System (ERNS)

Fact Sheet

Office of Emergency and Remedial Response
Emergency Response Division OS-210

Quick Reference Fact Sheet

The Emergency Response Notification System (ERNS) is a national computer database which provides the only centralized mechanism for documenting and verifying incident notification information as initially reported to the National Response Center (NRC), the U.S. Environmental Protection Agency (EPA), and to a limited extent, the U.S. Coast Guard (USCG). This initial notification data may be followed up with updated information from various Federal, State and local response authorities, as appropriate. ERNS contains data that can be used to analyze release notifications, support emergency planning efforts, and assist decision makers in developing spill prevention programs. This fact sheet provides summary information on notifications of releases of oil reported in accordance with the Clean Water Act (CWA). Under Section 311 of the CWA, discharges of oil which: 1) cause a sheen to appear on the surface of the water; 2) violate applicable water quality standards; or 3) cause sludge or emulsion to be deposited beneath the surface of the water or adjoining shoreline, must be reported to the NRC.

In the ERNS database, notifications involving the release of oil products are divided into two categories. The first category, "Petroleum," refers to all releases of materials that are petroleum or its by-products. ERNS specifies 64 different petroleum products. These products include: crude oil, heating oil, jet fuel, kerosene, automotive gasoline, and motor oil. Releases involving these 64 types of petroleum-based oil products account for approximately 41% of all the releases reported to ERNS, and 78% of oil and petroleum notifications, made in compliance with the CWA. The second category of oil products in ERNS contains all of the non-petroleum types of oil. There are 156 different non-petroleum types of "Oil" in ERNS. These materials include substances ranging from coconut, sunflower and other edible oils, to anthracene oil and coal. The non-petroleum oil notifications account for approximately 12% of all releases reported to ERNS.

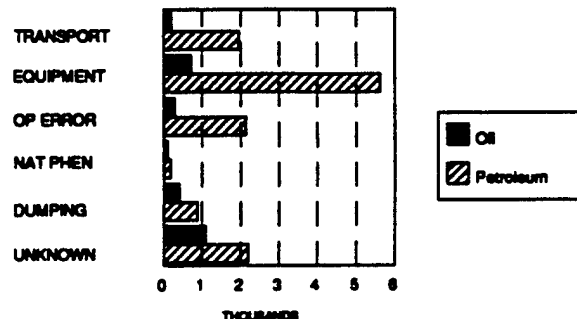
NUMBER OF OIL AND PETROLEUM NOTIFICATIONS RECEIVED ANNUALLY*

Type of Release	1987	1988	1989	1990	1991
"Petroleum" Notifications	12,550	12,399	12,567	14,085	14,520
"Oil" Notifications	3,027	2,768	3,507	4,761	4,744
Total Oil/Petroleum Notifications	15,577	15,167	16,074	18,846	19,264
Total Number of ERNS Notifications	28,677	29,874	34,104	34,259	35,653

Number of Oil/Petroleum Notification by Cause*
(1987 - 1991)

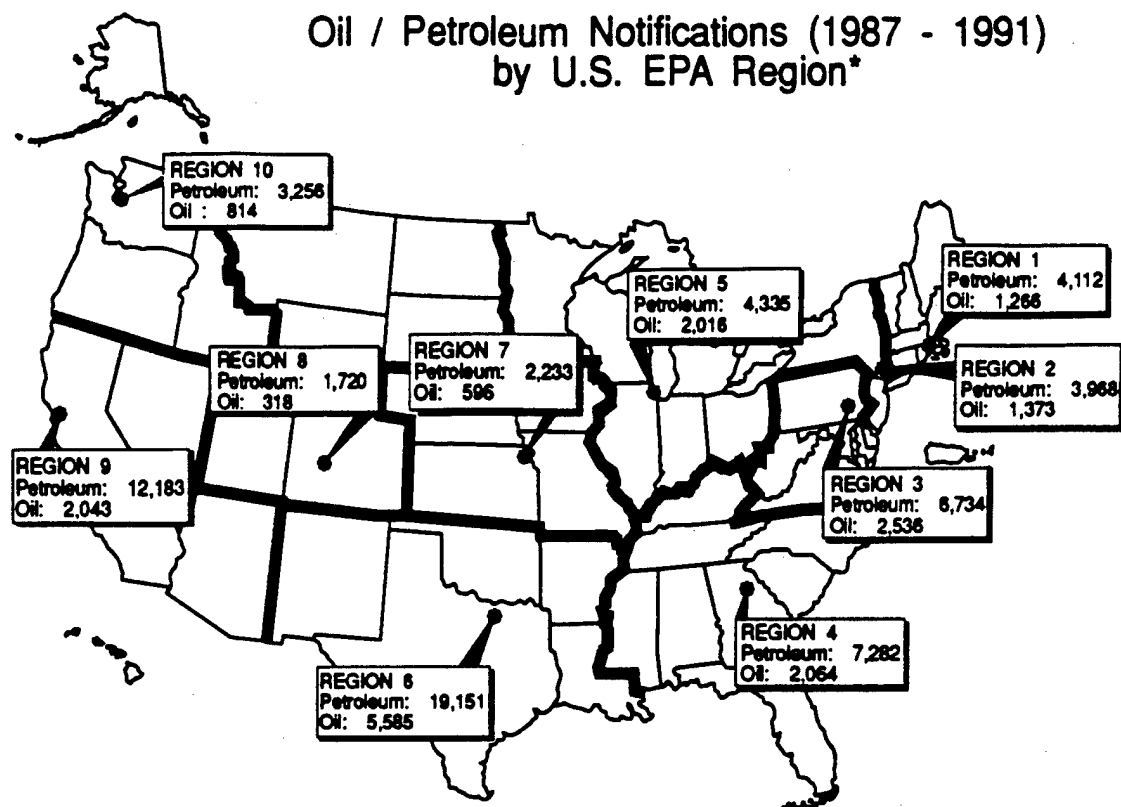
The following chart is a graphical representation of the distribution of oil and petroleum releases among the six "causes of release" in ERNS. The six causes are transportation accident, equipment failure, operator error, natural phenomenon, dumping, and unknown.

As the chart reveals, petroleum releases outnumber oil releases in all categories, by more than 2 to 1. Additionally, petroleum releases caused by equipment failure represent the largest number of recorded releases in ERNS.



*All numbers are based on initial notifications to the Federal government and may not have been verified.

The map below shows the number of oil and petroleum releases for each of the ten EPA regions. The largest numbers of reported oil/petroleum releases occurred in Regions 6 and 9. The data used in the map are cumulative, from 1987-1991.



The following table shows the size distribution of oil and petroleum notifications. ERNS data reveal that the largest number of notifications for both categories involve releases less than 1,000 gallons. Notifications involving releases in quantities greater than 100,000 gallons represent an average of .2% and .1%, for petroleum and oil respectively.

NUMBER OF OIL/PETROLEUM NOTIFICATIONS BY SIZE *

		1987	1988	1989	1990	1991
No Quantity Reported	Oil	1,230	1,189	0	0	0
	Petroleum	1,364	1,283	3	2	0
Less than 1,000 gallons	Oil	1,662	1,432	3,372	4,635	4,636
	Petroleum	10,001	10,052	11,424	12,895	13,321
1,000- 9,999 gallons	Oil	102	119	109	95	83
	Petroleum	980	878	938	980	998
10,000- 99,999 gallons	Oil	26	17	22	23	23
	Petroleum	177	163	170	184	181
100,000 gallons or greater	Oil	7	11	4	8	2
	Petroleum	28	23	32	24	20

For further information regarding ERNS, call the ERNS information line at (202) 260-2342, or write the ERNS Manager, U.S. EPA, at OS-210, 401 M St., SW, Washington, DC 20460.

*All numbers are based on initial notifications to the Federal government and may not have been verified.



An Overview of ERNS

Emergency Response Notification System (ERNS) Fact Sheet

Office of Emergency and Remedial Response
Emergency Response Division OS-210

Quick Reference Fact Sheet

The Emergency Response Notification System (ERNS) is a national computer database used to store information on releases of oil and hazardous substances. The ERNS program is a cooperative data sharing effort among the Environmental Protection Agency (EPA) Headquarters, the Department of Transportation (DOT) Research and Special Programs Administration's John A. Volpe National Transportation Systems Center (VNTSC), the ten EPA Regions, and the National Response Center (NRC). EPA Headquarters manages and funds ERNS, and the VNTSC provides operation and maintenance support through an interagency agreement with EPA. ERNS provides the most comprehensive data compiled on release notifications of oil and hazardous substances in the United States. Since its inception in 1986, more than 160,000 release notifications have been entered into ERNS.

RELEASE NOTIFICATIONS IN ERNS*

Notification Type:	1987	1988	1989	1990	1991
CERCLA	4,582	5,060	6,554	6,174	5,885
Oil	15,577	15,167	16,074	18,846	19,264
Other	8,518	9,647	11,476	9,239	10,504
Total for Year	28,677	29,874	34,104	34,259	35,653

CERCLA: Substances designated as hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, section 103.

Oil: Any oil discharge which: 1) causes a sheen to appear on the surface of the water; 2) violates applicable water quality standards; or 3) causes sludge or emulsion to be deposited beneath the surface of the water or upon the adjoining shorelines, reported in accordance with section 311 of the CWA.

Other: This category includes non-CERCLA, non-oil substances along with substances that could not be identified at the time of the release.

HOW ARE NOTIFICATIONS COLLECTED IN ERNS?

The ERNS data are captured electronically when a release is reported to the NRC or EPA. When a release report is submitted to Federal authorities, the individual reporting the release is asked a series of questions concerning the release. This information is then immediately transferred to the appropriate Federal response authority. For example, when the NRC receives the initial notification of a release, the information is immediately transmitted to the appropriate Federal On-Scene Coordinator (OSC) in an EPA Regional Office or Coast Guard District Office, depending upon the release location. In some cases reports are made directly to the EPA or United States Coast Guard (USCG) offices, at which time the Federal response authorities make a response determination. The OSC then relays the information to the appropriate State and local response authorities, as necessary.

Information concerning all releases originally reported to the NRC and EPA Regional Offices is entered into local computers and transmitted electronically from the NRC or EPA Regional Office to the VNTSC, where it becomes part of the ERNS national database. Each EPA Region maintains its own Region-specific database, which is a subset of the national database.

* All numbers are based on initial notification to the Federal government and may not have been verified.

WHAT INFORMATION IS IN ERNS?

Information is recorded in ERNS when a release is initially reported to the Federal government. These initial notifications contain the preliminary release information available at the time of the release. The information in ERNS is "unverified" because at the time of the release, some of the information reported to the Federal government may be incomplete or inaccurate. Depending upon the severity of the release and the response actions taken, the EPA or Coast Guard OSC obtains further information on the release by assisting at the site or discussing the incident with State, local, or other response officials. Where notification information is verified, more detailed data on the release may be added to ERNS, including information related to response actions. Often, however, the only information found in ERNS is information derived from the initial notification.

UNDER WHAT AUTHORITIES ARE THE NOTIFICATIONS IN ERNS REPORTED?

There are primarily five Federal statutes that require release reporting. Part or all of the information from these reports may be collected in ERNS. These statutes and their resulting regulations, their citations, and their relationship to ERNS are shown in the following table:

APPLICABLE FEDERAL STATUTES/REGULATIONS:

Statute	Cite	Description
CERCLA Section 103	40 CFR, Part 302, Section 302.6	This section requires that releases of hazardous substances which meet or exceed their reportable quantity (RQ) be reported to the NRC, who in turn will notify the appropriate Federal On-Scene Coordinator (OSC). These releases account for 17% of all the notifications in ERNS.
SARA Title III Section 304	40 CFR, Part 355	In this section, the release of an RQ or more, of a CERCLA hazardous substance or a SARA extremely hazardous substance, must be reported to Federal authorities. Non-CERCLA EHS releases must be reported to the State Emergency Response Commission (SERC) of any state likely to be affected by the release and to the Community Emergency Coordinator for the Local Emergency Planning Committee (LEPC) of any area likely to be affected by the release. It should be noted that few of these notifications are incorporated into the ERNS database. Transportation-related releases must be reported to the 911 emergency number or, in the absence of a 911 number, to a telephone operator.
CWA Section 311	40 CFR, Part 110, Section 110.10	This Section requires persons who release oil and hazardous substances to report the release to the appropriate Federal Agency, who will then immediately notify the appropriate state agency of any state which may be affected by the discharge. In the oil discharge regulations promulgated under this act, EPA establishes 3 categories of reportable discharges of oil. A discharge must be immediately reported to the NRC if it: 1) causes a sheen to appear on the surface of the water; 2) violates applicable water quality standards; or 3) causes sludge or emulsion to be deposited beneath the surface of the water or upon the adjoining shorelines. Oil notifications account for 52% of all notifications in ERNS.
CWA Section 311(b)(3)	40 CFR, Part 300, Sections 300.125, 300.300, 300.405	The NCP regulations require that oil or hazardous substance releases which violate the CWA be immediately reported to the NRC. If direct reporting to the NRC is not practicable, reports may be made to the Coast Guard or EPA designated OSC for the geographic area in which the discharge occurred.
HMTA Section 1808(b)	40 CFR, Subchapter C, Section 171.15	The HMTA requires dischargers to notify the NRC if as a direct result of the release: (1) a person is killed; (2) a person receives injuries requiring hospitalization; (3) estimated carrier or other damage exceeds \$50,000; (4) an evacuation of the general public occurs lasting one or more hours; (5) one or more major transportation arteries or facilities are closed or shut down for one hour or more; or (6) the operational flight pattern or routine of an aircraft is altered. Although these releases are reported under DOT authority, they may also be subject to EPA authority.

CERCLA:	The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended.
SARA:	The Superfund Amendments and Reauthorization Act of 1986, as amended.
CWA:	The Clean Water Act of 1972, as amended.
HMTA:	The Hazardous Material Transportation Act of 1974, as amended.
NCP:	The National Oil and Hazardous Substances Pollution Contingency Plan, as published under section 311(d) of the CWA, as amended by section 4201(b) of the Oil Pollution Act of 1990, or revised under section 105 of CERCLA.

WHAT IS ERNS USED FOR?

The primary purpose of ERNS is to standardize and collect notifications made to the Federal government of releases of oil and hazardous substances. These notifications are used by OSCs during, before and after data are entered into ERNS, to determine an appropriate Federal response action. Currently, ERNS data are used to assist decision makers in solving emergency response and release prevention issues. Specific examples of ERNS data applications include:

- Guidance and Regulatory Development
- Responses to Congressional Inquiries
- Response Preparedness
- Compliance and Enforcement Support
- Statistical and Trend Analysis
- Environmental Planning
- Spill Prevention Programs
- Legal Analyses
- Property Transfers/Site Audits
- Academic Research

WHAT TYPES OF ERNS DATA ARE AVAILABLE?

ERNS data is available to the public in various forms including computerized copies, printouts, summarized release totals, or 6250 BPI magnetic data tapes. Each of these formats serve a different purpose; the decision regarding what type of information is chosen depends on the individual needs of the requestor. Cost for providing ERNS data is determined based on the materials used and the time and effort expended to fill the request. General descriptions of the information formats are provided below:

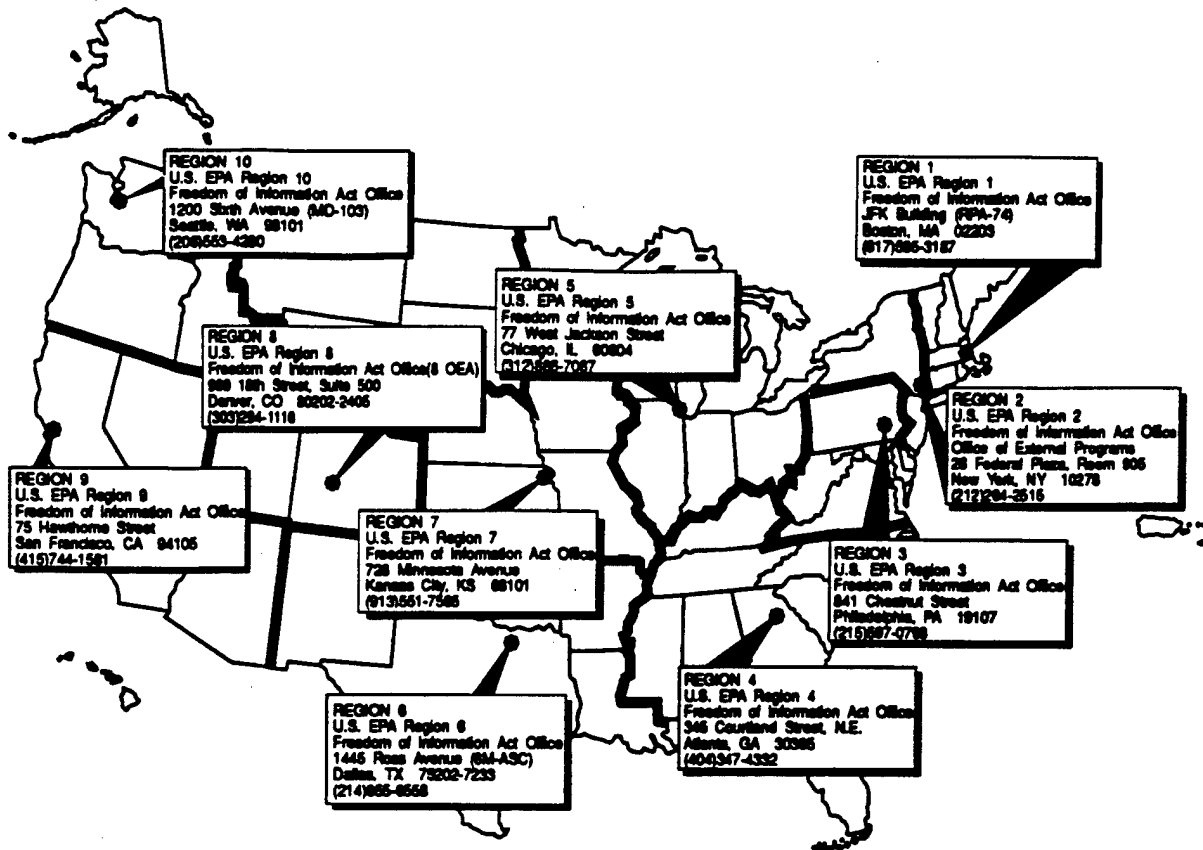
- **Standard ERNS Reports:** These reports provide a one page summary of the releases as reported to the Federal government. Standard ERNS reports can be obtained on a floppy disk or as a computer printout, depending upon the number of reports requested. Generally, these reports are best for providing specific information on a small subset of data. Searches best suited for this format include: searching for specific report numbers, searching for specific release dates, searching for specific dischargers, searching for information on specific chemicals, and searching for information on the county, city or address of the release.
- **Summary Release Totals:** This information is best suited for analyzing trends, or making comparisons of broad groups. Summary Information reports are not as detailed as the ERNS reports, but offer the requestor a broad overview of data. Examples of uses for Summary Information reports include: Comparisons of the number of release reports between States/calendar years/EPA Regions or cities, comparison of the number of release reports for broad chemical groups, and release reports categorized by the quantity of the material released.
- **Magnetic Data Tapes:** These tapes can be obtained in either ASCII or EBCDIC formats for each year in the database. Included with each tape is a data dictionary which references terms used in the ERNS national database and a Tapeout log showing record and block lengths including the number of records and blocks contained in each file. These tapes are typically provided to requestors who have extensive needs for ERNS data, and who have the hardware necessary to operate magnetic data tapes.

HOW CAN ERNS DATA BE OBTAINED?

Information on the ERNS system and data may be obtained by calling the ERNS Information Line at (202) 260-2342, or by contacting the Freedom of Information Act (FOIA) Officer in the specific EPA Region of interest. Addresses and telephone numbers of the EPA Regional FOIA offices are provided below. For more extensive materials, write to the EPA Headquarters FOIA Officer at:

U.S. Environmental Protection Agency
Freedom of Information Act Office (A-101)
401 M Street, SW
Washington, DC 20460

EPA Regional Contacts for ERNS Information



United States
Environmental Protection
Agency (OS-120)
Washington, DC 20460

Official Business
Penalty for Private Use
\$300

Incident Identification

Source Agency : NRC EPA Region : Report Number : 95269

Company : MINNEGASCO
Addr : 201 S 7TH ST

City : MINNEAPOLIS St : MN Zip : 55412

Material Reported

CHRIS Code : ONG CAS Number :
Material Spilled : NATURAL GAS Qty : 0.00 Units : UNK
Media spill released into : air

Description :
5/8 INCH GAS SERVICE LINE / MOBILE HOME EXPLODED, CAUSE HAS NOT YET
BEEN DETERMINED.

Incident Location

Spill Date : 11/05/1991
County : CARVER City : CHASKA
State : MN Zip :
Location :
130 JUDITH DRIVE

Cause/Source

Reported Cause : other
Source : pipeline

Damages/Actions

Injuries : Deaths : Evacuations :
Damages : Damage Cost :
Action :
FIRE DEPT SECURED THE GAS VALVE AND PUT OUT THE TRAILER FIRE. THE LINE
WAS SECURED TO RUN TESTS FOR LEAKAGE.

** Note: This information is based on initial notification data, and may be
subject to verification. **

This search was performed on 07/21/1992 and reflects information as of this date.